A NATURE LOVE AFFAIR: EXPLORING EDUCATION AS A MEANS TO FOSTER CONNECTION TO NATURE IN COLLEGE STUDENTS

A thesis presented to the faculty of the Graduate School of
Western Carolina University in partial fulfillment of the
requirements for the degree of Master of Experiential and Outdoor Education

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April 2023

ACKNOWLEDGEMENTS

I want to thank my committee members, Dr. Brad Faircloth and Dr. Jeremy Schultz, for their efforts and time spent on my thesis. Their knowledge and expertise helped me create my most significant academic accomplishment to date. My biggest thanks go to my chair, Dr. Callie Schultz. This work could not have been done without her help and constant support. I never felt alone on this journey, as she encouraged me every step of the way. Through the Experiential and Outdoor Education program, Dr. Callie Schultz has been my mentor, someone I look up to, and an individual I hold in the highest regard, both personally and academically. An additional thanks must be given to Debby Singleton. She is the true reason this study was possible. Debby is not only a mentor but also a friend. I aspire to reach students and connect them to nature as genuinely and wholeheartedly as she does. A final thank you goes to all my peers who were on this journey with me. You all are my family. Thanks for keeping me sane.

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LIST OF ABBREVIATIONS

CTN	Connection to nature
NR	Nature relatedness
NRS	Nature Relatedness Scale
WCU	Western Carolina University

ABSTRACT

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Connection to nature (CTN) has been linked to improved health and well-being and an increase in an individual's pro-environmental behaviors. CTN is often thought to be developed in one's childhood, but some studies have refuted this claim by studying CTN development in adults. This study used mixed methods to investigate whether Western Carolina University's Parks and Recreation Management course PRM 365: Nature Rx (a liberal studies course) impacted students' CTN. The findings of the study were compared with those of Lankenau (2018), who studied CTN in related college courses, by replicating his quantitative instrument. A MANOVA test produced nonsignificant results, $F(3, 28) = 2.09$, $p = .13$, indicating that Nature Rx had no impact on students' CTN. Qualitative results also showed minimal change pre-to-post semester as answers to prompted journal questions reflected a limited change across time. Both quantitative and qualitative results indicate that a ceiling effect may be a source of explanation for these results. However, more work must be done to decipher what about the course, or the population led to these results.

Keywords: connection to nature, higher education, public health, environmental health

CHAPTER ONE: INTRODUCTION

"We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love" (Gould, 1993, p. 40).

The list of ongoing planetary health concerns is extensive. Deforestation (Clement et al., 2015), pollution (Das & Horton, 2018), climate change (Hayhoe et al., 2018), and biodiversity loss (Hill, 2020) name a few of the most pressing problems. Not only is the planet currently enduring its sixth extinction event (Hill, 2020), but it also has seen a 1.8°F increase in temperature from 1901 to 2016, harming the lifecycle events of various plant and animal species (Hayhoe et al., 2018). These planetary health concerns are directly linked to anthropocentric causes and a decrease in positive human relationships with nature (Gould, 1993; Steffan et al., 2015). *Nature*, as defined by Bratman et al. (2019, p. 2), refers to "elements and phenomena of Earth's lands, waters, and biodiversity, across spatial scales and degrees of human influence." This definition suggests that nature can be found both inside and outside; however, for this paper, we specifically mean time spent in nature outdoors.

By definition, we as humans are indeed a part of nature, but often people have not fostered the connections with nature to believe this and live their lives like this is true. It is commonly perceived that humans are not part of nature and that a clear separation between the two entities exists (Cachelin et al., 2011; Williams, 2017). This perception solidifies the growing disconnection between humans and natural spaces that many are developing or already possess. Ultimately, the deficit in positive relationships with nature produces several consequences for humans and the planet (Williams, 2017). People may become physically and mentally less well

and unappreciative of nature as they lose a connection to it (Chawla & Derr, 2012; Maller et al., 2006). Connecting to nature is significant for increasing pro-environmental behaviors. Therefore, we can limit or reduce the planetary health concerns often attributed to human behavior (Schultz, 2000). A reconnection with nature for humans is undoubtedly needed as we are an animal species interwoven in Earth's processes, events, and the greater web of life on our planet. Fostering connections to nature, where individuals feel that they are no longer separate from nature but rooted emotionally within it, is likely to aid ecological preservation and benefit individual health and wellbeing (Cachelin et al., 2011; Gould, 1993). Therefore, we must nurture our relationships with nature so we may all begin to love and care for the complex natural world we are part of.

Connection to Nature

There are many terms used to describe one's relationship with nature, such as nature relatedness (Martyn & Brymer, 2016), nature connectedness (Howell et al., 2011), and ecological identity (Walton & Jones, 2018). In this thesis, I will use *connection to nature* (CTN) to reference this relationship. Specifically, I will use Salazar et al.'s (2020) definition of CTN: "connection to nature reflects the way people identify with predominantly natural landscapes and the relationships they form with the elements in those environments." (p. 6).

The specific routes for developing CTN are under debate as researchers remain in disagreement (Carr & Hughes, 2021; Hatty et al., 2020). Several researchers believe human contact with nature through "nature activities" is the main route to building CTN (Carr & Hughes, 2021; Hatty et al., 2020). In contrast, Lumber et al. (2017) concluded that there are five predictors or pathways to building CTN. These include contact, emotion, compassion, meaning, and beauty (Lumber et al., 2017). Each pathway describes a specific route for developing CTN.

The *contact* pathway refers to one's ability to connect with nature through touch, smell, taste, sound, and sight. The pathway of *emotion* reflects the creation of an emotional bond with the outdoors. Having empathy and caring for nature reflects the *compassion* route of CTN. Finding life meaning through natural landscapes or events is the *meaning* pathway to CTN. Becoming aware of the beauty of nature and appreciating its intricacies is the pathway of *beauty*. Lumber et al. (2017) found that nature activities that include several of the five pathways foster CTN more than contact alone, contradicting other research. CTN development may be complex; however, its importance to humans and the planet is abundantly clear in developing a view of humans as a part of nature.

Why is it Important?

CTN predicts one's likelihood to participate in pro-environmental behaviors (Schultz, 2000) and hold a positive relationship status with nature (Nisbet et al., 2009; Rusell et al., 2013). The physical, psychological, and environmental benefits of CTN are addressed substantially in the literature. Individuals who spend time in the outdoors often exhibit environmentally friendly behaviors and care more about protecting natural spaces from harm or degradation (Driver & Moore, 2005; Guthrie & Jenson, 2006; Larsen et al., 2019; Nisbet et al., 2009; Palmberg & Kuru, 2000; Schultz, 2000; Williams, 2017). Research also suggests that individuals with high CTN experience improved health and wellbeing (Bowler et al., 2010; Chawla, 2015; Chawla & Derr, 2012; Hartig et al., 2014; Kellert, 2012; Kuo, 2015; Rusell et al., 2013; Wise & Cane, 2019). Psychological benefits of stress reduction and increased positive affect are expected impacts of nature exposure (Brown et al., 2016; Kuo, 2015; Larson et al., 2016; Rusell et al., 2013). Physical benefits include boosts in immune system functioning and a decrease in one's chances of developing chronic illnesses (Brown et al., 2016; Larson et al., 2016; Williams, 2017).

Therefore, understanding CTN and building CTN is essential for not only the health of our environment (in fostering pro-environmental behaviors) but also for our physical and psychological health.

The Issue

Even though we know that the benefits of CTN positively impact both human and environmental health, CTN is declining (Hughes et al., 2019; Klepeis et al., 2001; Louv, 2005; United Nations Department of Economics and Social Affairs, 2018; Wells & Evans, 2003; White, 2012). This is due to a cultural shift in values of the 21st century characterized by the domination of technology (Merchant, 2006) and social media (Softas-Nall & Woody, 2017). The lure of technology and social media maintains this growing disconnect from the outdoors (Pergams & Zaradic, 2006; Robison & Ridenour, 2012; Zaradic & Pergams, 2007). Since 1987, a consistent decrease in human participation in outdoor activities in the United States has occurred (Pegrams & Zaradic, 2008). This is until the COVID-19 pandemic began in 2020. While under strict protocols to stay distanced from others, the outdoors presented a safer space to spend time while most were quarantined (Malle, 2021). The pandemic resulted in outdoor recreation participation reaching record levels (Landry et al., 2021). The future for outdoor recreation post-pandemic is still unfolding; however, one relevant study conducted by Landry et al. (2021) found a 26% reduction in trips per participant to public outdoor recreation spaces following the COVID-19 pandemic, as compared to pre-COVID-19.

On average, the typical individual in the United States spends 7.6% of their day outside (Klepeis et al., 2001). The period where human-nature relationships were required for survival is gone (Lumber et al., 2016; Merchant, 2006). Merchant (2006) argues that the Scientific Revolution of the 16th and 17th centuries was the initial catalyst of change leading to the

socialization of anthropocentric values throughout society (Lumber et al., 2017). Over the last three decades, Twenge et al. (2012) found that attitudes and behaviors promoting environmental sustainability have drastically declined. This is most evident in young adult populations (Twenge et al., 2012). Ultimately the growing disconnect presents implications significant for all living things. This includes public and environmental health factors. Decreases in physical and psychological wellness (Hinds & Sparks, 2008) and the continued rise in environmentally unsustainable behaviors (Louv, 2005) are evident.

This issue is two-fold. Not only is CTN declining (Merchant, 2006; Wells & Evans, 2003; White, 2012), but it is also thought to be developed during a limited window of time (Chawla, 2007). While still debated, several researchers suggest CTN is most significantly formed in childhood and can decline with age (Chawla, 2007; Wells & Lekies, 2006). Wells & Lekies (2006) found that experiences in nature before age 11 are the most influential in CTN development as opposed to later development in more mature life stages. This limits the potential for increasing CTN throughout life. It is also worth noting that within CTN literature, most studies focus on child populations (Chawla, 2007; Wells & Lekies, 2006). People in other stages of life, specifically college-aged students and older adults, are not studied as frequently, weakening the strength of the above claims regarding the limited window for developing CTN (Lankenau, 2018). More research is needed on adults to verify if CTN can be developed later in life in contrast to the above researchers' claims (Chawla, 2007; Wells & Lekies, 2006). Consequently, pro-environmental behavior development and improvements in one's wellness are therefore unattainable through CTN after this age, according to Wells & Lekies' (2006) findings.

Are adults without an already established CTN stemming from childhood a lost cause? Is it impossible to foster a CTN in adults to encourage the development of pro-environmental

behaviors and positive well-being? Recently, this has come into question. There has been a rising interest in whether CTN can be developed later in life, specifically in higher education classroom settings.

Lankenau's Nature Connectedness in Higher Education

We know that CTN is often developed in childhood, but can CTN be developed later in life, specifically in college? The current study explored the efficacy of a nature-based liberal studies course in fostering CTN. There have been a handful of studies exploring CTN development later in life (Freeman et al., 2019; Heezik et al., 2020; Houlden et al., 2018), but less research has been done with a focus on higher education (Cortese, 2003; Fernández et al., 2020). I have based my study on Lankenau's (2018) work which I will discuss in detail next. While most studies indicate that CTN is primarily developed in childhood (Chawla, 2007; Hughes et al., 2019; Wells & Lekies, 2006), Lankenau's (2018) work argues that the development of CTN in adulthood is possible. In this study, Lankenau used the Nature Relatedness Scale, a confirmed measure of CTN (Nisbet et al., 2009), to explore the following research question: "Can a particular introductory college-level ecology course increase learners' connectedness to nature?" (p. 231). Additionally, he compared this class with a second course asking the secondary research question, "Is this particular course more effective at increasing learners' connectedness to nature than a similar course?" (p. 231). Lankenau (2018) used a quasi-experimental design with a mixed-methods approach to answer the above questions.

The primary sample for Lankenau's (2018) study was undergraduate students at Pennsylvania State University enrolled in Biological Sciences (BI SC) 003: Environmental Science during a fall semester. This class will be referred to as BiSci 3 in this paper, as it was in Lankenau's article. The BiSci 3 class is a non-science introductory course offered to students to

fulfill university-wide general education requirements. Students were asked to complete the Nature Relatedness scale survey to assess CTN at the beginning of the semester in late August and again at the end of the semester in early December. Lankenau (2018) utilized a separate section of the same Biological Sciences class as a control group. This section was led by a different professor and was taught for knowledge acquisition instead of personal transformation and development of an earth connection like with BiSci 3. CTN was not a goal of the course for the control group. The students from this section completed the same pre-and post-surveys. Lankenau (2018) statistically evaluated the nature-relatedness survey scores from each class. The scores were coupled with qualitative interviews to produce a detailed conclusion (Lankenau, 2019). Changes in student scores, as well as the separate class scores, were analyzed. Results from the analysis showed that an increased CTN could indeed be instilled in higher education students as it was found that BiSci 3 increased CTN in students (Lankenau, 2018). It could not be concluded that environmental education programs automatically increase CTN as the control section of the Biological Science course showed no significant increase in scores.

Lankenau (2018) suggested that if CTN is threaded into the goals and approach of an environmental education program, nature connectedness can be fostered. This research provides hope for environmental educators and conservationists working to protect the planet from further harm and increase sustainability. However, the courses that Lankenau studied were not *explicitly* and *solely* focused on the human/nature connection. They were biological science courses. I began to contemplate what the result would be if a course with an entire curriculum focused on human/nature relationships was studied. Western Carolina University's course, *Nature Rx*, a general education requirement, is one such course with this curriculum.

Research Framework and Questions

My study is based on that of Lankenau (2018). I replicated Lankenau's research at Western Carolina University (WCU) apart from a modification I pursued for my qualitative methods. The purpose of the study was to explore whether a class with a curriculum specifically focused on CTN increases this connection for undergraduate students. If tested, how might these students score on Lankenau's (2018) instrument? WCU offers an undergraduate course in the Parks and Recreation Management (PRM) program titled PRM 365: Nature Rx. It was the focus of my work. This study refers to the class simply as Nature Rx. It is a liberal studies course that satisfies university-wide general education requirements, similar to BiSci 3, the focus of Lankenau's (2018) work. The university description for this course is as follows:

> Nature Rx explores the connection between nature and wellness. Students will gain a better understanding of the research associated with the social, emotional, intellectual, and physical health benefits of engaging in, and with, nature. This understanding is developed through participating in easy, accessible micro-adventures; interactive labs to explore the science behind the research; nature-based creative, mindfulness activities; and guided discovery assignments. The class helps students to develop a mind-body connection to nature with a focus on overall wellness. (Singleton, 2022)

Similar progressive pedagogical approaches are utilized in Nature Rx and BiSci 3, where students complete projects and participate in reflective assignments instead of formal exams (Lankenau, 2018; Singleton, 2022). While both classes emphasize CTN and personal reflection, the content covered in each varies. Nature Rx is primarily taught outdoors, unlike BiSci 3, which utilizes a typical classroom environment, as stated in Lankenau's (2018) class description. This is an important distinction as connections to nature are cited to increase with direct experiences outdoors (Lumber et al., 2017; Williams, 2017).

This study investigated whether WCU's Nature Rx course fostered a CTN in students by replicating Lankenau's (2018) quantitative instrument. Specifically, I sought to answer two research questions:

1. How does Nature Rx, a semester-long liberal studies undergraduate course, impact students' connection to nature?
2. How do the results from this study compare to those of Lankenau's (2018) study?

I used an embedded mixed methods design to answer these questions. I replicated the quantitative portion of Lankenau's study to address both research questions. I also introduced journaling as a qualitative tool to explore student responses to research question one in more depth. I hypothesized that Nature Rx would increase CTN in undergraduate students and reflect a greater development than Lankenau's BiSci 3 course. Therefore, the purpose of this study was to investigate the efficacy of a nature-based liberal studies course in fostering CTN by replicating Lankenau's study. I hypothesized that Nature Rx would increase CTN in undergraduate students and reflect a greater development than Lankenau's research focus of BiSci 3.

CHAPTER TWO: LITERATURE REVIEW

Society faces a growing concern as people become increasingly more disconnected from nature (Klepeis et al., 2001; Louv, 2005). With humans spending less time outdoors, there are limited opportunities to foster a CTN in the population. This poses a threat to both environmental and public health. People feeling a decreased CTN are less likely to display pro-environmental behaviors towards the planet or derive any substantial health benefits from nature. Therefore, there is a need to investigate and understand the importance of fostering CTN in all populations to address environmental and public health concerns.

Extensive research suggests that CTN is developed in childhood and decreases with age; however, more studies are investigating the possibility of fostering CTN in adulthood. One population significantly overlooked in CTN literature is undergraduate college students. To appropriately frame a case for this research study to explore whether a class with a curriculum focused on nature connections increases CTN for undergraduate students, this literature review will look to unpack three topics: research on current human relationships with nature in America, the importance of being outside, and CTN. In addition, several subthemes will be highlighted, such as the significance of CTN, and how and when CTN is developed.

What is the State of Current Human Relationships with Nature in America?

It is clear from the literature that human relationships with nature are deteriorating. With each generation, a growing disconnect ensues, and CTN decreases (Hughes et al., 2019; Klepeis et al., 2001; Louv, 2005; Lumber et al., 2017; United Nations Department of Economics and Social Affairs, 2018; Wells & Evans, 2003; White, 2012). Scholars have identified through several studies that people spend less time outdoors than ever before (Bobilya et al., 2010; Louv,

2005; United Nations Department of Economics and Social Affairs, 2018). In one such study, Pegrams and Zardic (2008) concluded that since 1987, a consistent decrease in human participation in outdoor activities has occurred. It is estimated that the typical individual in the United States spends only 7.6% of their day outside, leaving 92.4% spent indoors (Klepeis et al., 2001). Nature-deficit disorder, a term coined by Richard Louv (2005), best describes this downward relationship trend. Nature-deficit disorder refers to the change in attitudes and behaviors of individuals toward nature, especially in younger populations (Louv, 2005). Louv addresses the alienation youth are experiencing from the outdoors and its negative effect on their health. Children are not the only population who develop unfavorable relationships with nature. Twenge et al. (2012) concluded that young adult populations have also consistently declined in their favorable attitudes toward nature over the last three decades.

Several factors contribute to this deteriorating relationship with the outdoors in all age groups. Urbanization, technology, and social media are considered two of the most significant elements in the decline of relationships with nature (Bobilya et al., 2010; Louv, 2005; Softas-Nall & Woody, 2017). The use of land increases as the world continues to urbanize. Not only is urbanization reducing the physical area of natural spaces, but also can cause environmental damages to those few still in existence (Merchant, 2006). Urbanization ultimately limits one's access to nature-related activities locally and the chance to develop or maintain a relationship with the outdoors. Digital technology (think TV, smartphones, video games, and social media) can similarly limit access to the outdoors but in different ways. Children are indulging in more screen time than previous generations. Unstructured outside play has been widely abandoned as an everyday activity for youth and replaced by video games and watching television (Michealson et al., 2020; Pergams & Zaradic, 2006; Robison & Ridenour, 2012). Digital technological

advancements have encouraged an addictive amount of screenplay and social media use in youth and adults (Pergams & Zaradic, 2006; Robison & Ridenour, 2012; Softas-Nall & Woody, 2017). This is another example of how digital technology has dominated society along with urbanization to maintain the growing divide between humans and nature. With the proliferation of digital technologies and apps promising to meet all of our entertainment and educational needs, one begins to ask why having a relationship with nature matters. Do we really *need* to have a relationship with nature?

Why is it Important for People to Spend Time Outside in Nature?

Time in nature is an essential factor in the well-rounded lives of people (Ghimire et al., 2014). A positive full-body response producing psychological and physical benefits is often the result of contact with natural outdoor spaces. Nature can be defined in different ways. To mitigate confusion, the definition of nature utilized in the current study will align with this description given by Bratman et al. (2019, p. 2); Nature encompasses "elements and phenomena of Earth's lands, waters, and biodiversity, across spatial scales and degrees of human influence." As the focus of this work is CTN development through time spent in nature *outdoors* when nature is referenced, I am specifically addressing nature found outside rather than inside. The above definition also aligns with the assumption that nature can be as simple as a grassy area behind your house or as complex as a protected national park. The size nor complexity of an outdoor environment dictates whether it can be considered nature. Benefits are found in outdoor settings on both ends of the spectrum.

Nature is a significant resource that produces many benefits to human well-being (Ghimire et al., 2014; Larson et al., 2016) and general health (Brown et al., 2016; Kim et al., 2016; Markevych et al., 2017). Referring to Bowler et al. (2010), those who spend more time in

natural environments have consistently higher health and levels of well-being than those without exposure. Andre et al. (2017) found similar results in a separate study that concluded that participating in outdoor recreation activities produced mental and physical benefits to one's health. Results showed that contact with nature lowers stress, increases social connections, decreases physical inactivity, improves fitness, and incites environmental sensitivity (Andre et al., 2017; Brown et al., 2016; Kim et al., 2016). These studies support the common positive association of public health with time spent outside. These findings are highly studied in both child and adult populations (Brown et al., 2016; Kim et al., 2016). An abundance of research supports the notion of increased health and wellness; however, each has varying degrees of evidence (Brown et al., 2016; Kim et al., 2016; Markevych et al., 2017). Two main categories of wellness benefits are to be discussed: physical and psychological changes.

Physical Benefits of Time Spent Outside in Nature

A physical response to nature is evident throughout the literature. A common finding among researchers is improvements in one's blood pressure (Duncan et al., 2014; Jidong et al., 2012; Li et al., 2011). Duncan et al. (2014) concluded through a pretest and post-test comparison design that of the school children tested, those who experienced the test activity in the presence of a natural green space were significantly more likely to have lower blood pressure after than those who had no green space. Jidong et al. (2012) and Li et al. (2011) support these findings for improved blood pressure in response to nature exposure.

Another physical benefit of time outdoors is the enhancement of immune system functioning (Li et al., 2008, 2009; Li, 2010). The results were linked to the inhalation of Phytoncides or the volatile aromatic substances produced through plants. These Phytoncides are associated with an increase in Natural Killer cell (NK cell) activity (Li et al., 2009). NK cells are

essential immune cells in the body. The link between NK cells and nature exposure suggests that time spent simply breathing in a natural environment could significantly improve one's immune system to fight off things that cause illness, increasing overall wellness. Many scholars have investigated the specific health outcomes of exposure to nature (Brown et al., 2016; Kim et al., 2016; Larson et al., 2016). Across the board, researchers agree that nature is a mitigating factor for many general health concerns, including those deemed chronic (Brown et al., 2016; Kim et al., 2016). Therefore, it can be concluded that both the ease of access to green spaces one has and the amount of time one regularly spends in the natural world may be significant indicators of someone's health.

Psychological Benefits of Time Spent Outside in Nature

Research also strongly links psychological improvements and nature exposure (Bratman et al., 2021; Cox et al., 2017; Liu et al., 2021; Meidenbauer et al., 2020). Improvements in one's affect is seen across the literature (Bratman et al., 2012, 2019, 2021, Meidenbauer et al., 2020). Affect refers to the expression of an individual's emotions. Positive affect increases as negative affect inversely responds when one is exposed to nature (Bratman et al., 2012, 2019, 2021, Meidenbauer et al., 2020). Other benefits such as better mood (Ambrey et al., 2016; Fleming et al., 2016), regulation of emotions (Han, Ke-Tsung, 2017), increased happiness (Larson et al., 2016), and reduced stress (Fan et al., 2011) exist. Studies have found links between nature exposure and reduced rates of depression and its symptoms (Beyer et al., 2014; Taylor et al., 2015). Scholars investigated the prescribing rates of antidepressants for an area and compared them to the density of trees on the corresponding area's streets (Taylor et al., 2015). Their study yielded results to support the assertion that depression and nature exposure are inversely associated.

Another psychological impact of nature is on cognition. Cognitively, the brain can restore itself, and according to Bratman et al. (2012) and Markevych et al. (2017), time in nature exists as a catalyst for this change. Kaplan (1995) asserts that nature is highly restorative and details how restoring cognition due to time outdoors increases one's capacity to remain attentive and reduces mental fatigue. This is often referred to as the attention restoration theory, which remains highly studied as it reoccurs across the literature (Bratman et al., 2012; Markevych et al., 2017; Williams, 2017). However, the mechanisms that cause these changes are underrepresented in scholarly work and need further investigation, as cited by Markevych et al. (2017).

Developing a spiritual connection is another benefit of being in nature (Meis-Harris et al., 2021). Transcendentalists such as Ralph Waldo Emerson and Henry David Thoreau advocated for the idea that spending time in nature is a spiritual event (Guthrie & Jenson, 2006, p 41). People who experience nature frequently or for extended periods go through transcendent encounters and spiritual growth (Meis-Harris et al., 2021). These experiences take the individual out of themselves and connect them to something much more prominent in life, such as the awe of nature (Roy, 2001). When someone can extend themselves past egotistical concerns, their place in existence is put in perspective. This helps individuals find a sense of spiritual satisfaction. Humans have an interconnected role within the world's ecosystem. As an animal species, we have evolved and need to understand that we are part of nature, which is good for us (Roy, 2001).

Time spent outdoors has the power to generate a feeling of "oneness" with the environment. Larson et al. (2019) concluded that participants link increased outdoor time and nature connectedness. This supports the notion that time in nature fosters a connection to the earth and its processes. One's relationship to the planet is significant as it encourages a higher

quality of life as one develops a sense of meaning (Meis-Harris et al., 2021). This brings joy and happiness through feelings of security or reassurance. Those who interact and connect with nature are more aware of their surroundings (Guthrie & Jenson, 2006). The development of a CTN often allows people to gain a sense of one's place within the earth's grandeur (Larsen et al., 2019). People can better understand physical grounding and belonging to geographical locations, thus supporting mental wellness (Larson et al., 2019).

The literature suggests we need nature in our lives for physical and mental health. Research also encourages people to experience the outdoors and develop a CTN. Though several questions remain: What is CTN? What significance does it have? How is it developed? And when?

What is CTN?

A connection to nature or CTN is a construct used to describe one's relationship with nature. This is subjective and different for everyone. Salazar et al. (2020) defines CTN as "the way people identify with predominantly natural landscapes and the relationships they form with the elements in those environments." (p. 6). Nature relatedness (Martyn & Brymer, 2016), nature connectedness (Howell et al., 2011), and ecological identity (Walton & Jones, 2018) are a few of the numerous terms synonymous with CTN. Again, I will use *connection to nature* or CTN to describe the relationship. In reference to Furness' (2021) conclusions, researchers studying CTN commonly conceptualize the term in three distinct ways. It may be viewed as the development of an ecological self, the outcome of biophilia, or the added cognizance that an individual is part of a complex web of nature (Furness, 2021). The body of literature on CTN is extensive; however, a great variety of instruments and research methods present barriers to comparing results and conclusions.

Several debates emerge in the literature regarding aspects of CTN. There is disagreement regarding whether CTN is single or multidimensional. While Mayer & Frantz (2004) describe how the construct reflects only a single dimension, researchers such as Nisbet et al. (2009) and Tam (2013) disagree, stating CTN includes emotional, cognitive, and behavioral elements. Newer studies adopt a multidimensional view more often than those published in previous years (Oh et al., 2021). Another critical fact to remember is that it is unclear whether CTN should be considered a state or a trait (Hatty et al., 2020). In some studies, CTN is observed as a trait. This references how an individual's CTN is relatively stable, like an attitude or personality trait but varies from person to person (Nisbet et al., 2009). The opposing view argues that CTN is more of a state, meaning an individual is in a specific condition during certain times (Mayer et al., 2009). For example, someone's CTN state may change depending on the frequency of nature exposure or the nature-related activity performed. More research is needed to conclude the nuances of CTN.

What is the Significance of CTN?

CTN is significant for two main reasons. The first is its association with improved health and wellbeing (Bowler et al., 2010; Chawla, 2015; Chawla & Derr, 2012; Hartig et al., 2014; Kellert, 2012; Kuo, 2015; Martin et al., 2020; Rusell et al., 2013; Wise & Cane, 2019). Evidence suggests that CTN is an essential element of public health (Jackson et al., 2021; Louv, 2005; Pasca et al., 2022; Williams, 2017) as they share a positive relationship (Martin et al., 2020; Pasca et al., 2022; Wise & Cane, 2019). Jackson et al. (2021) investigated CTN, outdoor activity participation, and adolescents' mental health before and during the COVID-19 pandemic. They concluded that outdoor activities that fostered a greater CTN reinforced the health and well-being benefits of participating in said outdoor activities (Jackson et al., 2021). Mental health

benefits, including increased happiness and mindfulness, are also associated with CTN and are a widely cited topic in the literature (Chavaly & Naachimuthu, 2020; Ciu & Yang, 2020; Liu et al., 2022). Liu et al. (2022) quantified elements of this mental health improvement. They found that individuals with an above-average CTN encounter a 7% higher feeling of worthiness and a 6.4% increase in life satisfaction (Liu et al., 2022).

Second, CTN's significance can be linked to its direct translation into sustainable behaviors and attitudes (Bamberg, 2003; Oh et al., 2021; Soga et al., 2016; Tan, 2013; Whitburn et al., 2020). Empathy towards the environment, production of pro-environmental behaviors, and sustainable attitudes are critical factors in how CTN development aids planetary health concerns. Individuals who spend time outdoors and experience CTN often exhibit environmentally friendly behaviors and care more about protecting natural spaces from harm (Larsen et al., 2019; Nisbet et al., 2009; Palmberg & Kuru, 2000; Schultz, 2000). CTN motivates pro-environmental behaviors and increases empathy (Mayer & Frantz, 2004). These sustainable attitudes and actions toward the planet are considered a frequent outcome of CTN development (Hatty et al., 2020). Therefore, CTN is essential in mitigating environmental concerns (Hatty et al., 2020; Oh et al., 2021; Tan, 2013; Zelenski et al., 2015). The more individuals with a developed CTN, the less harm the environment may endure. This is critical to combating our current environmental crisis.

Few studies examine participant health and environmental stewardship variables within a single study. This is surprising as both human and environmental health are in a parallel decline. However, Martin et al. (2020) conducted one such study on the relationships between three types of nature contact, psychological connectedness, health, subjective well-being, and pro-environmental behaviors together in one study. This study's ability to synthesize interconnected

factors resulted in Martin et al. (2020) giving a significant recommendation stating that "interventions increasing both contact with, and connection to nature, are likely to be needed to achieve synergistic improvements to human and planetary health" (p. 2). The recommendation has implications for fields such as conservation and health care as substantial evidence arises supporting CTN relationships in improving public and environmental health. With a clear picture of CTN's importance, one must now investigate how and when it is developed.

How is it Developed?

The specific routes for developing CTN are under debate as researchers disagree on its antecedents (Carr & Hughes, 2021; Hatty et al., 2020; Hughes et al., 2019). Though, many researchers do agree that individual experiences contribute to one's CTN development (Lumber et al., 2016). Direct contact with nature and participation in outdoor nature-related activities are repeatedly cited as the main routes to building CTN (Carr & Hughes, 2021; Furness, 2021; Hatty et al., 2020; Mayer et al., 2009). However, this is consistently challenged. As documented, Michealson et al. (2020) studied both direct and indirect experiences of nature. In this case, the indirect experiences were in electronic or virtual formats (Michealson et al., 2020). Consequently, both types of encounters led to CTN development combating the above claims that only direct experiences can do so. Additionally, forms of education, including environmental education (Kleespies & Dierkes, 2020; Lankenau, 2018; Prevost et al., 2018; Talebpour et al., 2020) and specific activities such as hands-on ecosystem restoration (Furness, 2021) have similarly been investigated in CTN development. In contrast, other researchers propose that CTN acquisition relies on several factors rather than a single event or action. Culture, familial relationships with nature, and previous outdoor experiences were acknowledged by Salazar et al. (2020) as elements in fostering CTN.

Lumber et al. (2017) most notably advised from their work that there are five predictors or pathways to building CTN. These include contact, emotion, compassion, meaning, and beauty (Lumber et al., 2017). Contact refers to CTN acquisition by interacting with nature through one's five senses. Creating an emotional bond with the outdoors describes the *emotion pathway*. Having empathy and caring for nature reflects the *compassion* avenue of CTN. Finding life meaning through natural landscapes or events is the *meaning pathway* to CTN. Becoming aware of the beauty of nature and appreciating its complexity is the *pathway of beauty*. According to study findings, nature activities that include these elements foster CTN above direct nature contact alone. Lumber et al. (2016) encourage movement beyond just simple exposures outside and knowledge of the environment to create deeper relationships with nature. Immersion through the all five pathways is the most powerful.

When is it Developed?

Substantial age-related patterns are present in CTN literature. In a compelling study of people ages 5 to 75, data was generated to support initial CTN accumulation in childhood (Hughes et al., 2019). Researchers uncovered that CTN declines with age. This relationship diminishes from childhood until reaching an abrupt low in the teenage years (Hughes et al., 2019). CTN increases to a degree in early adulthood but experiences a plateau before encountering a decline across the remainder of one's lifespan (Hughes et al., 2019). Therefore, the emphasis on childhood CTN development reoccurs in the literature. Several researchers agree that the most crucial time in CTN development is adolescence (Chawla, 2007; Cheng & Monroe, 2012; Hughes et al., 2019; Wells and Lekies, 2006). Wells & Lekies (2006) documented that experiences in nature within the period before age 11 are the most influential in CTN generation. A supporting study to this finding explored three sample populations, including

environmental activists, children, and college students (Bruni & Schultz, 2010). The work uncovered that both environmental activists and children reported greater CTN than college students.

Consequently, the large body of evidence regarding childhood nature connections as most valuable presents limits to one's potential for developing CTN throughout their life. This also affects the accumulation of human and environmental health benefits derived from CTN. Is it possible for undergraduate college students to develop a greater CTN? Will an outdoor class dedicated to fostering relationships with nature effectively create nature connections in these adults?

CHAPTER THREE: METHODOLOGY AND METHODS

Methodology: Embedded Mixed-Methods Design

This study aimed to investigate whether Western Carolina University's Nature Rx course fostered a CTN in students by replicating Lankenau's (2018) quantitative instrument. Specifically, I sought to answer two research questions:

1. How does Nature Rx, a semester-long liberal studies undergraduate course, impact students' connection to nature?
2. How do the results from this study compare to those of Lankenau's (2018) study?

To address how Nature Rx impacts students' CTN and how the results compared to Lankenau's (2018) study, I used an embedded mixed-methods study design (Creswell & Plano Clark, 2011) that paralleled Lankenau's design with one variation (explained below).

This mixed-methods study informed the researcher with complex numerical data through quantitative pre- and post-surveys (using the Nature Relatedness Scale) and open-ended data through pre-and post-journals (using prompted qualitative journal writing). This provided an additional research dimension with rich and nuanced explanations to support the quantitative data (Creswell & Plano Clark, 2011; Saldana, 2016). This study used qualitative data to supplement and aid in the understanding of the quantitative data. It includes personal perspectives, thus creating a holistic picture of CTN and Nature Rx to answer my first research question. In addition, I needed to include both quantitative and qualitative research methods to adequately replicate components of Lankenau's (2018) study and address my second research question aimed at comparing the two studies. It is essential to highlight the methods used in Lankenau's (2018) work to clarify where my study aligns and diverges. Lankenau also used

mixed methods. He administered a modified Nature-Relatedness scale (NRS) survey both pre- and post-semester (Lankenau, 2018). I replicated this portion of the study exactly. He then used interviews with select participants to provide context for his quantitative findings. Instead of interviews, I used journal assignments that are an existing part of the Nature Rx class.

My mixed methods research used an embedded or nested design (Creswell & Plano Clark, 2011). This best describes a study design in which one data set plays a secondary or supportive role in a study where a separate primary data set is focused (Creswell & Plano Clark, 2011). For this research, the qualitative study (journaling) is considered the secondary data embedded within the quantitative research or the primary data (pre-and post-NRS scores). This is in an effort to reflect the same design elements of Lankenau (2018), where quantitative data (pre- and post-NRS scores) was of central focus, and qualitative data (interviews) was only supplemental. Though this primary and secondary data choice was made to mimic that of Lanknau's (2018) study, it is still advantageous for further developing the survey results. These design choices increase the context for the numerical data (Saldana, 2016). In this way, my study builds upon Lankenau's (2018) as it adds a new and differing sample of participants.

While quantitatively, the studies align, I moved away from Lankenau's (2018) qualitative interviews instead for two reflective journal prompt writings. I chose to change this design piece of Lankenau's study as requiring journal responses at the beginning and end of the semester will help explain how one's CTN may change chronologically across the semester of Nature Rx. Journaling is also a common reflective activity of the class providing additional backing for its use. The first journaling entry was completed after the initial survey was given at the beginning of the semester. The second journal entry was done before the final NRS survey was administered at the end of the semester. This timeline was appropriate because adding qualitative

elements during quantitative methods aids in validating the quantitative outcomes (Creswell & Plano Clark, 2011; Saldana et al., 2011). This study design was most appropriate for the research questions as it enhances the understanding of the quantitative results of the NRS survey by representing participant voices and experiences in their journaling. In the following sections of this chapter, I begin by discussing the participant population and the Nature Rx course before discussing the quantitative and qualitative study methods. I end by addressing my role as a researcher.

Participant Population

Participants in this study were students at Western Carolina University (WCU) during the fall 2022 semester. WCU is a public regional comprehensive university in rural western North Carolina. There are upwards of 12,000 students enrolled at the university, with approximately 10,500 of those being undergraduates. More than 75% of students are between 18 and 24 years old (Fun Facts, n.d.). Specifically, I was interested in students enrolled in the Parks and Recreation Management class, PRM 365: Nature Rx. The study had a sample of 31 students with 18 coming from section one and 13 from section two of the class. While there were two sections of this course taught by two separate professors, the assignments, class activities, and modules were almost entirely the same. Both had the exact same class objectives and syllabus. Only minor differences between the sections were present. Only Nature Rx students who provided consent, completed the pre-survey and post-survey and wrote both journal entries were included in the study. This sample is purposive as they meet characteristics necessary for the study, such as being enrolled in Nature Rx. The population can be generalized to comparable universities relative to WCU, which are also public and rural regional comprehensive universities.

The Course: Nature Rx

Nature Rx satisfies liberal studies requirements at WCU. Liberal studies courses develop students' abilities to think critically, problem-solve, appreciate arts, utilize technology appropriately, communicate, and progress in their personal development (WCU). At WCU, an undergraduate student must complete forty-two credit hours in liberal studies. These hours are broken down into three categories: The Core (21 hours), The Perspectives (18 hours), and The First-Year Seminar (3 hours) (Liberal Studies Program, n.d.). Nature Rx satisfies 3 of these hours under the Perspectives category. The Perspectives consist of social sciences, history, humanities, fine and performing arts, and world culture classes. Each class is identified using a "P," standing for perspectives, followed by a number that coincides with one of the specific disciplines. In the case of Nature Rx, it is a P4: humanities course. An additional requirement of liberal studies at WCU is that one approach taken in the Perspectives category must be at a 300 or 400 level (Liberal Studies Program, n.d.). These are known as upper-level perspectives (ULP). Nature Rx is one such ULP. The course is an elective in the PRM major but is also offered to any undergraduate student enrolled at WCU.

The students in the Nature Rx class consisted of various majors and brought with them different histories with nature. Remember, it is an outdoors-based course that meets outside weekly. Nature Rx strives to teach students about the connection between nature and wellness (Singleton, 2022). Students are exposed to a series of studies relevant to the extensive health benefits of engaging in and with nature. The class utilizes nature as a modality for wellness by including activities with creative, mindful, scientific, and micro-adventure-based elements (Singleton, 2022). Nature Rx both offers and encourages opportunities for students to develop a CTN. The class has several primary objectives. These are pulled directly from the course syllabus (see Appendix A).

By the end of this course, students will be able to…

1. Explain why nature makes them happier, healthier, and more creative through critical analysis of research, guided assignments, and readings.
2. Practice and reflect upon various outdoor, nature-based activities that are easily accessible and enjoyable to the student.
3. Apply the research and science focused on the benefits of nature into personal practice to enhance their overall health and well-being.
4. Encourage and assist others to get outside and enjoy the benefits of time spent in and with nature. (Singleton, 2022)

These are the same across both sections of Nature Rx included in the sample. To meet these objectives, students complete several assignments with reflective elements such as a personal field experience, a Nature Rx prescription, and weekly learning modules.

Quantitative Method: Nature Relatedness Scale

The quantitative method utilized was a pre/post-survey. Several validated instruments assess one's CTN, such as the Original Environmental Identity Scale or the Connectedness to Nature Index (Salazar et al., 2020). Specifically, I used the Nature Relatedness Scale (NRS; see appendix B). The NRS (Nisbet et al., 2009; Salazar et al., 2020) is a validated survey to measure a person's emotional, cognitive, and physical connection to nature. This specific scale was utilized by Lankenau (2018) in his study of CTN in higher education; therefore, to make my results comparable, I maintained identical instruments and included a similar quantitative design.

The survey is scored on a five-point Likert scale. It produces an overall "NR" score and scores for three subcategories of nature-relatedness. The subcategories include scores for self

(emotional connectedness), perspective (cognitive connectedness), and experience (physical connectedness) of nature (Salazar et al., 2020). The survey consists of 21 statements regarding nature. Survey respondents select scores ranging from 1 = strongly disagree to 5 = strongly agree. Special attention was given to the data analysis as some statements were reverse-scored (Salazar et al., 2020). NR scores of 1–2 indicate a lower connection to nature, a score of 3 indicates neither a low nor a high connection, and 4–5 shows a higher connection level to nature (Nisbet et al., 2009; Salazar et al., 2020). The NRS is a validated instrument that effectively gives an overall NR score and scores for three subcategories within a single survey (Salazar et al., 2020).

Lankenau (2018) used a modified version of the NRS. The current study also took this modification into account to maintain identical instruments. Lankenau made two minor modifications. Study Item #5, "I always think about how my actions affect the environment," was changed to "I usually think about how my actions affect the environment" to be more consistent with the linguistic labels assigned to the Likert scale. The second modification was for Item #18, "Conservation is unnecessary because nature is strong enough to recover from any human impact," which was changed to two items: "Wilderness conservation is unnecessary," and "Nature is strong enough to recover from any human impact." Lankenau found this statement to be double-barreled. While speaking with Lankenau (personal communication, March 2022), he stated, "In my revised instrument, these two new items were given equal weight relative to all other items when computing the overall NR score and the NR-Perspective sub-score." This means that the NR score used an average of 22 items, and the NR-Perspective sub-score used an average of 8 items.

Quantitative Procedures

Nature Rx professors administered the modified nature-relatedness scale as Lankenau (2018) did to their own classes on printed paper. This was done with all students as a class activity at the beginning of the fall 2022 semester. The quantitative surveys were collected and given to me for calculation with the survey key. The scores were then entered into columns in a digital excel sheet. Each student was assigned a corresponding participant number and row within the excel sheet. The same NRS survey was administered to all students a second time at the end of the same semester. The scores were again calculated and added to the former excel sheet. Data for students that did not consent to the study, fill out either the pre- or post-survey or complete a journal entry was thrown out.

Quantitative Data Analysis

Statistical analyses were used to evaluate the quantitative data from the surveys to address this study's research questions. I used the SPSS online statistical analysis tool. To address question one about how Nature Rx impacts learners' CTN, my first level of analysis evaluated the changes in participant test scores, looking for any statistically significant differences between pre-and post-for all variables (perspective, experience, and self-CTN scores). The most powerful way to conduct this within-subjects test was to use a repeated measures Multivariate Analysis of Variance (MANOVA) with a significance level of $p \leq .05$. A repeated measures MANOVA test compares pre and post-test scores with multiple variables from the same data set with a single test (Creswell & Creswell, 2018). Each NRS subscale was included in the model as a separate predictor variable. Alternatively, the data could have been analyzed by conducting separate t-tests for each variable and require adjusting the p-value. However, the MANOVA test provides an output of one p-value, indicating a significant difference between the pre and post on at least one of the variables. Change in the overall NR

score was assessed using a repeated measures Analysis of Variance (ANOVA) with a significance level of $p \leq .05$.

Regarding my second research question of how Nature Rx compares to Lankenau's course BiSci 3, the second level of analysis intended to compare the post-test data from my group and Lankenua's group. I planned to use the pre-test data as a covariate; therefore, I would run a Multivariate Analysis of Covariates (MANCOVA) test. A MANCOVA test with a significance level of $p \leq .05$ is the most powerful way to address this research question because the pre-test scores would account for portions of the variance that otherwise would be attributed to an error in the model (Rausch et al., 2003). Accounting for any differences between groups at the outset by using the pre-test scores as covariates would have allowed for groups to be easily equated. I intended to report effect size as an additional source of comparison. However, the statistical tests within the second level of analysis were not run due to nonsignificant results being found in the first level of analysis.

Qualitative Method: Journaling

Saldana et al. (2011) state that documentation in diaries or journals helps gather written reflexive participant data for research. Journal documents reflect and metaphorically represent a participant's thoughts, feelings, and values (Saldana et al., 2011; Tuckette & Stewart, 2003). A supporting study by Lutz & Paretti (2019) found that reflective prompts can effectively capture the experiences and perceptions of research participants in a survey of college students like the current study's sample.

Nature Rx commonly uses journaling for assignments (Singleton, 2022). As a typical class activity, journaling also helps meet Nature Rx class goals and objectives of reflection and CTN development. Given these reasons, journaling was the most logical choice for gathering

qualitative data. The journal writing is a required class assignment for all students and serves as qualitative research data for those who consented to participate in this study. Journaling was completed using Canvas and addressed my first research question regarding the impact of Nature Rx on students' CTN through two prompted journal writings. The prompt (see appendix C) posed several questions to encourage students to reflect on the five pathways of CTN development cited by Lumber et al. (2017). These questions included:

1. What does the word "nature" mean to you?
2. Describe your current connection to nature (reflecting the five CTN development pathways). In doing so, please address the following.
    a. How do you connect with nature using your body and senses, if at all? (*Contact*)
    b. How do you feel about nature? How do you feel when you are in nature? (*Emotion*)
    c. What steps, if any, do you take to care for nature? (*Compassion*)
    d. Have you ever found life meaning through natural landscapes or natural events? If so, please share. (*Meaning)*
    e. Where do you see beauty in nature, if at all? (*Beauty*)
3. Overall, how connected do you feel to nature?

Qualitative Method Procedure

Nature Rx professors assigned the journal prompts to their students. All students completed these for a class grade. The first entry was completed at the beginning of the fall 2022 semester following the pre-NRS survey. The final entry occurred just before the post-survey was administered at the end of the same semester. The journals were written online in Canvas. The

journals were critical to this study as they gave detailed individual accounts that express the numerical data collected through the NRS surveys.

Qualitative Method Analysis

Journaling requires inductive and deductive data analysis (Creswell & Creswell, 2018). Inductive data analysis refers to the researcher going through the data to develop themes or categories. The deductive analysis is different as it requires researchers to determine if there is additional evidence to support each theme. The journal entries helped describe the study results through a complex and holistic picture (Tuckette & Stewart, 2003). To evaluate the journal entries, the researcher utilized methods of coding. Coding generally breaks the data into categories with a representative phrase as a title (Saldana et al., 2011; Tuckette & Stewart, 2003). The basic coding steps include organizing the data, reading each journal, coding, generating themes, and representing the themes in a qualitative narrative (Creswell & Cresswell, 2018; Saldana, 2016). This study used in vivo coding specifically. In vivo coding breaks the data into codes of words or phrases by directly extracting participant language from the data source (Saldana et al., 2011). This highlights significant language and summarizes experiences (Saldana et al., 2011). After reading the journals and extracting codes, I listed them in the order they appeared in the source. Next, I clustered the codes (or phrases) into themes for analysis based on my interpretation of the data.

Role as a Researcher

As the researcher, my contact with the participants varied as I also assumed a role as a graduate teaching assistant for the 2022/2023 academic year in PRM 365: Nature Rx. This position was primarily remote, except for a few class periods I attended in person. As to prevent any pressures related to my authority over students with my graduate position, an unaffiliated

individual with the class, Dr. Callie Schultz, obtained consent on my behalf. She provided both Nature Rx class sections with an overview of the study in person and allowed time for questions. This occurred in late September for section one and early October for section two. I was not present for the recruitment process. Dr. Schultz clearly communicated my research requirements to students using a recruitment script where it was explicitly stated that participants had the right to refuse participation at any time. It was clarified to the students that their participation in my study would not impact their grades in the course. The prompted journaling and survey completion included in my qualitative and quantitative methods were existing grades within the course for everyone; however, whether they permitted me to have their work in my study did not parallel any educational benefits or consequences. I successfully obtained approval from the institutional review board, which ensures my study indeed meets standards of ethics and safety. Only individuals who consent and agreed with the form were included in the study.

As part of the EOE thesis handbook, I have chosen the manuscript thesis format option. This option requires chapters 1-2-3 plus a full-length manuscript aimed at a specific journal and formatted as such. In this option, the following chapter will be my complete manuscript, which will include chapters 4 and 5 of this paper. I have chosen to submit to Environmental Education Research, which requires authors to submit a manuscript of typically 5000 to 7000 words (including references and tables or figures) written in APA format.

CHAPTER FOUR: JOURNAL ARTICLE

A Nature Love Affair: Exploring Education as a Means to Foster Connection to Nature in College Students

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For consideration in: *Environmental Education Research*

Word Count: 7376

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A Nature Love Affair: Exploring Education as a Means to Foster Connection to Nature in College Students

Abstract:

Connection to nature (CTN) has been linked to improved health and well-being and an increase in an individual's pro-environmental behaviors. CTN is often thought to be developed in one's childhood, but some studies have refuted this claim by studying CTN development in adults. This study used mixed methods to investigate whether Western Carolina University's Parks and Recreation Management course PRM 365: Nature Rx (a liberal studies course) impacted students' CTN. The findings of the study were compared with those of Lankenau (2018), who studied CTN in related college courses, by replicating his quantitative instrument. A MANOVA test produced nonsignificant results, $F(3, 28) = 2.09$, $p = .13$, indicating that Nature Rx had no impact on students' CTN. Qualitative results also showed minimal change pre-to-post semester as answers to prompted journal questions reflected a limited change across time. Both quantitative and qualitative results indicate that a ceiling effect may be a source of explanation for these results. However, more work must be done to decipher what about the course or the population led to these results.

Keywords: connection to nature, higher education, public health, environmental health

A Nature Love Affair: Exploring Education as a Means to Foster Connection to Nature in College Students

"We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love" (Gould, 1993, p. 40).

The list of ongoing planetary health concerns is extensive. Deforestation (Clement et al., 2015), pollution (Das & Horton, 2018), climate change (Hayhoe et al., 2018), and biodiversity loss (Hill, 2020) name a few of the most pressing problems. These concerns can be directly linked to anthropocentric causes and decreases in positive human relationships with nature (Gould, 1993; Steffan et al., 2015). There are many terms used to describe one's subjective relationship with nature, such as nature-relatedness (Martyn & Brymer, 2016) and ecological identity (Walton & Jones, 2018). In this study, *connection to nature* (CTN) was chosen to reference this relationship. Specifically, I used Salazar et al.'s (2020) definition of CTN: "connection to nature reflects the way people identify with predominantly natural landscapes and the relationships they form with the elements in those environments" (p. 6).

CTN predicts one's pro-environmental behaviors (Schultz, 2000) and positive human/nature relationship status (Nisbet et al., 2009). Therefore, understanding how CTN is developed is essential for not only the health of our environment (in fostering pro-environmental behaviors) but also for our physical and psychological health. Even though we know that the benefits of CTN positively impact both human and environmental health, CTN is declining (Hughes et al., 2019; Klepeis et al., 2001; Louv, 2005; White, 2012). This may be due to a cultural shift in values of the 21st century characterized by the domination of technology (Merchant, 2006) and social media (Softas-Nall & Woody, 2017). The lure of these

technological advancements is thought to maintain the growing disconnect of humans from the outdoors (Robison & Ridenour, 2012; Zaradic & Pergams, 2007).

Not only is CTN declining (Merchant, 2006; Wells & Evans, 2003; White, 2012), but it is also thought to be developed during a limited window of time (Chawla, 2007). While still debated, several researchers suggest CTN is most significantly formed in childhood and declines with age (Chawla, 2007; Wells & Lekies, 2006). Is it possible to foster a CTN in adults to encourage the development of pro-environmental behaviors and positive well-being? This has come into question more frequently. There has been a rising interest in exploring the possibilities for development of CTN later in life.

Lankenau's Nature Connectedness in Higher Education

A handful of studies exist exploring CTN development later in life (Freeman et al., 2019; Heezik et al., 2020), but less research has been done with a specific focus on higher education (Cortese, 2003; Fernández et al., 2020). One such study that addressed this setting was done by Lankenau (2018). Lankenau used the Nature Relatedness Scale (NRS), a validated measure of CTN (Nisbet et al., 2009), to explore the following research question: "Can a particular introductory college-level ecology course increase learners' connectedness to nature?" (p. 231). Additionally, Lankenau (2018) compared this class with a second course asking the secondary research question, "Is this particular course more effective at increasing learners' connectedness to nature than a similar course?" (p. 231). Lankenau (2018) used a quasi-experimental design with a mixed-methods approach to answer the above questions.

The primary sample for Lankenau's (2018) study was undergraduate students at Pennsylvania State University enrolled in Biological Sciences (BI SC) 003: Environmental Science during a fall semester. This class is referred to as BiSci 3. However, to my knowledge,

Lankenau's (2018) study has not been replicated to explore CTN with other courses or colleges/universities. What if, for example, a course was specifically focused on nature connectedness? How might students score on Lankenau's (2018) instrument? With this in mind, this study aimed to investigate the efficacy of a nature-based liberal studies course in fostering CTN. I hypothesized that Nature Rx would increase CTN in undergraduate students and reflect a greater development than Lankenau's research focus of BiSci 3. Specifically, I sought to answer this primary research question:

1. How does Nature Rx, a semester-long liberal studies undergraduate course, impact students' connection to nature?

I also sought to address this secondary question:

2. How do the results from this study compare to those of Lankenau's (2018) study?

An embedded mixed methods design was used to answer these research questions. I replicated the quantitative portion of Lankenau's (2018) study. Different from Lankenau, I introduced journaling as a qualitative tool to explore student responses to research question one in more depth. I hypothesized that Nature Rx would increase CTN in undergraduate students and reflect a greater development than Lankenau's research focus of BiSci 3.

Literature Review

Human Relationships with Nature in America

We as humans are indeed a part of nature, but often people have not fostered the connections with nature to live their lives like this is true. *Nature*, as defined by Bratman et al. (2019), refers to "elements and phenomena of Earth's lands, waters, and biodiversity, across spatial scales and degrees of human influence" (p. 2). This definition suggests that nature can be found indoors and outdoors; however, within this study, I specifically define "nature" with a

focus on natural elements outdoors. Many individuals commonly perceive that humans are not part of nature and that a clear separation between the two entities exists (Cachelin et al., 2011). This perception solidifies the growing disconnection between humans and natural spaces that many are developing or already possess. On average, the typical individual in the United States only spends 7.6% of their day outside (Klepeis et al., 2001; Williams, 2017). Merchant (2006) argues that the Scientific Revolution of the 16th and 17th centuries was the initial catalyst of change in human relationships with nature, leading to the socialization of anthropocentric values (Lumber et al., 2017). Over the last three decades, Twenge et al. (2012) found that attitudes and behaviors promoting environmental sustainability have drastically declined. This is most evident in young adult populations (Twenge et al., 2012). Ultimately, the deficit in positive relationships with nature produces several consequences for humans and the planet (Twenge et al., 2012).

The Importance of Connecting to Nature

A reconnection with nature for humans is undoubtedly needed as we are an animal species interwoven in Earth's processes, events, and the greater web of life on our planet. Fostering connections to nature, where individuals feel that they are no longer separate from nature but rooted emotionally within it, is likely to aid ecological preservation and benefit individual health and wellbeing (Cachelin et al., 2011; Gould, 1993). Therefore, we must nurture our relationships with nature so we may all begin to love and care for our complex natural world.

Individuals who spend time outdoors often exhibit environmentally friendly behaviors and care more about protecting natural spaces from harm (Larsen et al., 2019; Nisbet et al., 2009; Palmberg & Kuru, 2000). Therefore, we can limit or reduce the planetary health concerns often attributed to human behavior by increasing human CTN (Schultz, 2000). Research also suggests that individuals with high CTN experience improved health and well-being (Bowler et al., 2010;

Chawla, 2015; Hartig et al., 2014; Wise & Cane, 2019). Psychological benefits of stress reduction and increased positive affect are expected impacts of nature exposure (Brown et al., 2016; Larson et al., 2016). Physical benefits include boosts in immune system functioning and a decrease in one's chances of developing chronic illnesses (Brown et al., 2016; Larson et al., 2016).

CTN Development

The specific routes for developing CTN are under debate as researchers remain in disagreement (Carr & Hughes, 2021; Hatty et al., 2020). Several researchers believe human contact with nature through "nature activities" is the main route to building CTN (Carr & Hughes, 2021; Hatty et al., 2020). In contrast, Lumber et al. (2017) concluded that there are five predictors or pathways to building CTN. These include contact, emotion, compassion, meaning, and beauty (Lumber et al., 2017). Each pathway describes a specific route for developing CTN. The *contact* pathway refers to one's ability to connect with nature through touch, smell, taste, sound, and sight. The pathway of *emotion* reflects the creation of an emotional bond with the outdoors. Having empathy and caring for nature reflects the *compassion* pathway of CTN. Finding life meaning through natural landscapes or events is the *meaning* pathway to CTN. Becoming aware of the beauty of nature and appreciating its intricacies is the pathway of *beauty*. Lumber et al. (2017) found that nature activities that include several of the five pathways foster CTN more than contact alone, contradicting other research. CTN development may be complex; however, its importance to humans and the planet is abundantly clear in developing a view of humans as a part of nature.

Wells & Lekies (2006) found that experiences in nature before age eleven are the most influential in CTN development as opposed to later development in more mature life stages. This

limits the potential for increasing CTN throughout life, therefore, stunting further possible pro-environmental behaviors attributed to this connection. It is also worth noting that within CTN literature, most studies highlight child populations (Chawla, 2007; Wells & Lekies, 2006). People in other stages of life, specifically college-aged students and older adults, are not studied as frequently, weakening the strength of the above claims regarding the limited window for developing a CTN.

CTN and Higher Education

While most studies indicate that CTN is primarily developed in childhood (Chawla, 2007; Hughes et al., 2019; Wells & Lekies, 2006), Lankenau's (2018) work argues that the development of CTN in adulthood is possible. This was found after investigating BiSci 3. BiSci 3 class is a non-science introductory course offered to students to fulfill university-wide general education requirements (Lankenau, 2018). Students were asked to complete the NRS survey to assess CTN at the beginning and end of the semester. Lankenau (2018) utilized a separate section of the same Biological Sciences class as a control group. This section was led by a different professor and was taught for knowledge acquisition instead of personal transformation and development of an earth connection like with BiSci 3. For the control group, CTN was not a goal of the course. The students from this section also completed the same pre-and post-surveys.

Lankenau (2018) statistically evaluated the NRS scores from each class. The scores were coupled with qualitative interviews with select students for analysis (Lankenau, 2018). Changes in student scores, as well as the separate class scores, were analyzed. Results from the analysis showed that an increased CTN could indeed be instilled in higher education students as BiSci 3 increased NR scores in students (Lankenau, 2018). It could not be concluded that environmental

education programs automatically increase CTN as the control section of the Biological Science course showed no significant increase in scores.

Lankenau (2018) suggested that if CTN is threaded into the goals and approach of an environmental education program, CTN can be fostered. This research provides hope for environmental educators and conservationists working to protect the planet from further harm and increase sustainability. However, Lankenau's courses were not *solely* focused on the human/nature connection. They were biological science courses and maintained this class content.

Study Site: Nature Rx

WCU offers an undergraduate course in the Parks and Recreation Management (PRM) program titled PRM 365: Nature Rx. This study will refer to the class simply as Nature Rx. It is a liberal studies course that satisfies university-wide general education requirements, like BiSci 3, the focus of Lankenau's (2018) work. The university description for this course is as follows:

> Nature Rx explores the connection between nature and wellness. Students will gain a better understanding of the research associated with the social, emotional, intellectual, and physical health benefits of engaging in, and with, nature. This understanding is developed through participating in easy, accessible micro-adventures; interactive labs to explore the science behind the research; nature-based creative, mindfulness activities; and guided discovery assignments. The class helps students to develop a mind-body connection to nature with a focus on overall wellness. (Singleton, 2022)

Similar progressive pedagogical approaches are utilized in Nature Rx and BiSci 3, where students complete projects and participate in reflective assignments instead of formal exams (Lankenau, 2018; Singleton, 2022). While both classes emphasize CTN and personal reflection,

the content covered in each varies. Nature Rx is also primarily taught outdoors, unlike BiSci 3, which utilizes a typical classroom environment, as stated in Lankenau's (2018) class description. This is an important distinction as connections to nature are cited to increase with direct experiences outdoors (Lumber et al., 2017).

Nature Rx strives to teach students about the connection between nature and wellness (Singleton, 2022). Students are exposed to a series of studies relevant to the extensive health benefits of engaging in and with nature. The class utilizes nature as a modality for wellness by including activities with creative, mindful, scientific, and micro-adventure-based elements (Singleton, 2022). Nature Rx both offers and encourages opportunities for students to develop a CTN. The class has several primary objectives. These are pulled directly from the course syllabus.

By the end of this course, students will be able to…

1. Explain why nature makes them happier, healthier, and more creative through critical analysis of research, guided assignments, and readings.
2. Practice and reflect upon various outdoor, nature-based activities that are easily accessible and enjoyable to the student.
3. Apply the research and science focused on the benefits of nature into personal practice to enhance their overall health and well-being.
4. Encourage and assist others to get outside and enjoy the benefits of time spent in and with nature. (Singleton, 2022)

To meet these objectives, students will complete several assignments with reflective elements such as a personal field experience, a Nature Rx prescription, and weekly learning modules.

Liberal studies courses, like Nature Rx, develop students' abilities to think critically, problem-solve, appreciate arts, communicate, and progress in their personal development (WCU). At WCU, an undergraduate student must complete forty-two credit hours in liberal studies. These hours are broken down into three categories: The Core (21 hours), The Perspectives (18 hours), and The First-Year Seminar (3 hours) (Liberal Studies Program, n.d.). Nature Rx satisfies 3 of these hours under the Perspectives category. The Perspectives consist of social sciences, history, humanities, fine and performing arts, and world culture classes. Each class is identified using a "P" standing for perspectives, followed by a number that coincides with one of the specific disciplines. In the case of Nature Rx, it is a P4: humanities course. An additional requirement of liberal studies at WCU is that one approach taken in the Perspectives category must be at a 300 or 400 level (Liberal Studies Program, n.d.). These are known as upper-level perspectives (ULP). Nature Rx is one such ULP. The course is an elective in the PRM major but is also offered to any undergraduate student enrolled at WCU.

Methods

Embedded Mixed-Methods Design

To address how Nature Rx impacts students' CTN, I used an embedded mixed-methods study design (Creswell & Plano Clark, 2011) that paralleled Lankenau's original design with one variation (explained below). The qualitative portion of the study (prompted journaling) is considered the secondary data embedded within the quantitative research or the primary data (pre-and post-NRS survey). In the current study quantitative data is considered primary in efforts to reflect the same design elements of Lankenau's (2018) study, where quantitative data (pre/post-Nature Relatedness survey) was of central focus, and qualitative data (interviews) was supplemental. Though this primary and secondary data choice was made to mimic that of

Lanknau's (2018) study, it is still advantageous for further developing the survey results as it increases the context for the numerical data (Saldana, 2016). In this way, my study builds upon Lankenau's (2018) as it added a new and differing sample of participants.

While quantitatively, the studies align, I moved away from Lankenau's (2018) qualitative interviews that followed students' completion of BiSci 3 instead for two reflective journal prompt writings. I chose to change this design piece of Lankenau's study as requiring journal responses at the beginning and end of the semester will help explain how one's CTN may change chronologically across the semester of Nature Rx. Journaling is also a common reflective activity of the class providing additional backing for its use.

Participant Population

Participants in this study were students at Western Carolina University (WCU) during the fall 2022 semester. WCU is a public regional comprehensive university in rural western North Carolina. There are upwards of 12,000 students enrolled at the university, with approximately 10,500 of those being undergraduates. More than 75% of students are between 18 and 24 years old (Fun Facts, n.d.).

This study investigated two sections of the same Nature Rx course, each taught by a separate instructor. Though instructors differed, both taught using the same course text, similar activities, and had identical goals for the class. Only minor differences between the sections were present. Only Nature Rx students above 18 years old who provided consent, completed the pre- and post-surveys and wrote both journal entries were included in the study. This sample was purposive as they meet characteristics necessary for the study, such as being enrolled in Nature Rx. The sample included 31 participants. 18 came from section one of the course. The remaining 12 were from section two. 17 majors were also represented and depicted in Table 1. The

population can be generalized to comparable universities relative to WCU, which are also public and rural regional comprehensive universities.

Table 1

Number of Participants by Major

Majors	**Number of Participants**
Parks and Recreation Management	9
Recreational Therapy	3
Marketing	2
Entrepreneurship	2
Psychology	2
Environmental Science	2
Nursing	1
Emergency Disaster Management	1
Biology	1
Secondary Science Education	1
Accounting	1
Art Education	1
Art	1
Cultural Anthropology	1
Mechanical Engineering	1
Forensic Science	1
Social Work	1
Total	**31**

Quantitative Methods

The instrument used to address the change in participant CTN over the course of the semester was the Nature-Relatedness Scale (NRS; Nisbet et al., 2009; Salazar et al., 2020). The NRS is a 20-item measure. Participants were asked to respond using a five-point Likert scale ranging from 1, “disagree strongly,” to 5, “strongly agree.” The NRS can be scored to produce an overall "NR" score, in addition to three subscale scores for self (emotional connectedness), perspective (cognitive connectedness), and experience (physical connectedness) of nature (Salazar et al., 2020). This specific scale was utilized by Lankenau (2018) in his study of CTN in

higher education with two modifications which increased the total item measures to 22. The current study also used this modified NRS to maintain identical instruments and scoring assessments.

To address question one about how Nature Rx impacts learners' CTN, my first level of statistical analysis evaluated the changes in participant test scores, looking for any statistically significant differences between pre-and post-for all variables (physical, emotional, and cognitive CTN scores). Given that there are 3 subscales, the most powerful way to conduct this within-subjects test was to perform a repeated measures MANOVA with each subscale included in the model as a separate predictor variable (Creswell & Creswell, 2018). Separate *t*-tests could also be conducted for each subscale, but that would require adjusting the alpha level due to conducting multiple tests (Creswell & Creswell, 2018). Change in the overall NR score was assessed using a repeated measures ANOVA.

Regarding my second research question of how Nature Rx compares to Lankenau's course BiSci 3, the second level of analysis intended to compare the post-test data from my group and Lankenua's group. I planned to use the pre-test data as a covariate; therefore, I would run a Multivariate Analysis of Covariates (MANCOVA) test. A MANCOVA test with a significance level of $p \leq .05$ is the most powerful way to address this research question because the pre-test scores would account for portions of the variance that otherwise would be attributed to an error in the model (Rausch et al., 2003). Accounting for any differences between groups at the outset by using the pre-test scores as covariates would have allowed for groups to be easily equated. I intended to report effect size as an additional source of comparison. However, the statistical tests within the second level of analysis were not run due to nonsignificant results being found in the first level of analysis.

Qualitative Methods

The method of journaling addressed my first research question regarding the impact of Nature Rx on students' CTN through two prompted journal writings. Participants completed the first journal assignment following the pre-test survey at the beginning of the semester. The second journal assignment preceded the post-survey at the end of the semester. The prompt posed several questions to encourage students to reflect on the five pathways of CTN development, as cited by Lumber et al. (2017). These questions included:

1. What does the word "nature" mean to you?
2. Describe your current connection to nature (reflecting the five CTN development pathways). In doing so, please address the following.
    a. How do you connect with nature using your body and senses, if at all? (*Contact*)
    b. How do you feel about nature? How do you feel when you are in nature? (*Emotion*)
    c. What steps, if any, do you take to care for nature? (*Compassion*)
    d. Have you ever found life meaning through natural landscapes or natural events? If so, please share. (*Meaning)*
    e. Where do you see beauty in nature, if at all? (*Beauty*)
3. Overall, how connected do you feel to nature?

A total of 31 pre-journal entries and 31 post-journal entries were collected from participants. As the primary investigator, I began by pairing participants' pre- and post-journal entries. In vivo coding was used to evaluate the journal entries and break down the data by question (Saldana et al., 2011). Within each question, I coded by idea using words or phrases by directly extracting

participant language from the data source. After reading the journals and extracting codes, I clustered the codes (or phrases) into themes for analysis based on my interpretation of the data.

Results

Quantitative Results

To answer the first research question, which sought to address how Nature Rx impacts students' CTN, SPSS was used to run a within-subject repeated measure MANOVA and ANOVA. The ANOVA analysis was performed to address the change in the composite NR score. The MANOVA analysis evaluated the change in participants' pre-and post-test scores in each of the three subscales. This allowed for testing differences in group means (i.e., pre and post) for multiple variables simultaneously. With an alpha level of $p = .05$, this test determines if these findings would be replicated in the overall population 95% of the time. Table 2 displays the mean pre-and post-test scores for each of the dependent variables. The table also provides the change in scores across the semester.

Table 2

Mean Pre- and Post-test Scores for Nature Rx Students

Pre- and post-test scores	Pre-test	Post-test	Change
Nature Relatedness (NR) Composite	4.04 (.14)	4.13 (.18)	+.09
NR-Self	4.12 (.71)	4.23 (.72)	+.11
NR-Perspective	3.86 (.43)	3.99 (.50)	+.13
NR-Experience	4.16 (.52)	4.20 (.65)	+.04

Note: Numbers in parenthesis are standard deviation

The MANOVA test produced nonsignificant results, $F(3, 28) = 2.09$, $p = .13$. Therefore, we fail to reject the null hypothesis, which was that H_0 = Nature Rx will have no impact on CTN.

These findings indicated that through assessing all variables in a multivariate framework, there is no difference between students' CTN from the beginning to the end of the Nature Rx course. As a result of not achieving a statistically significant result, no follow-up tests were performed.

Table 3

F-Values for all Variables

Effect	F	df	Error df	Sig.
MANOVA	2.09	3	28	.13
NR-Self	2.02	1	30	.17
NR-Perspective	2.89	1	30	.1
NR-Experience	.32	1	30	.58

Note: Computed using alpha = .05

Nature-relatedness composite. Among the sample of undergraduate Nature Rx students, the mean pre-test composite NR scores were M = 4.04, SD = .14. Mean post-test composite NR scores showed a +.09 points difference but were non-significant, $F(1, 62) = .83$, $p = .36$.

NR-Self: self in nature. For NR-Self, the mean pre-test scores were M = 4.12, SD = .71. Mean post-test NR-Self scores changed by +.11 however, the difference was non-significant, $F(1, 30) = 2.02$, $p = .17$.

NR-Perspective: nature-focused worldview. Regarding students' scores for NR-Perspective, the mean pre-test scores had a mean of M = 3.86, SD = 43. From mean pre-test NR-Perspective scores, post-test scores had a difference of +.13 but were non-significant, $F(1, 30) = 2.89$, $p = .1$.

NR-Experience: comfort with nature. For NR-Experience, the mean pre-test scores had a mean M = 4.16, SD = .52. Mean post-test NR-Experience scores differed by +.04 points from the corresponding pre-test scores but were non-significant, $F(1, 30) = .32$, $p = .58$.

Qualitative Results

The qualitative results below are organized to directly link the five pathways of CTN development (Lumber et al., 2017) to participant responses. I chose to report the results from the pre-and post-journal entries by question, with each already corresponding to one of the five CTN pathways.

Question 1. What does the word "nature" mean to you? This question was used to address participants' personal perceptions of nature. Several themes emerged among journal entries pre-and post: "nature as a place," "nature as a thing," and "nature as a feeling." Most participants noted superficial physical characteristics of nature (for example, "it's the grass" or "it's the trees") in their descriptions in pre-semester journal entries. In responses after the course, participants referenced a greater variety of characteristics, including those that were broader and more abstract, to describe what nature means to them. For example, to illustrate the difference between pre-and post-, in participant 11's pre-journal, they wrote, "To me, the word "nature" means a few different things. It means literal objects, such as trees, grass, flowers, animals, rivers, leaves, etc. Nature also means places to me. A forest, a mountain, an environment." Their response became more complex as they wrote in their post-course journal,

> After this semester, it is very hard for me to personally define the word "nature." Nature is all-encompassing. It's prevalent in our lives and resilient. Even in a big city, there is greenery, either from the well-manicured trees which line the streets or the haggard little sprout worming its way up through the pavement. Nature is a comfort; it is always there and hopefully always will be. I've grown confident that when I need her, Mother Nature will be there to dry my tears or, to join in on my laughter.

In sum, students define nature as a place, feeling, and thing and their definitions of nature were more complex after the course.

Question 2. Describe your current connection to nature. In doing so, please address the following.

2a. How do you connect with nature using your body and senses, if at all? (Contact).

Subquestion 2a investigates participants' CTN through the contact pathway of development, where individuals build relationships with nature through the body's five senses (Lumber et al., 2017). Participants reported using a culmination of *all senses* in both pre-and post-journal entries. Specifically, "sight," "touch," "smell," and "hearing" were the most referenced senses used to connect with nature pre and post. Journal entries written at the beginning of the semester had no direct mention of taste. The addition of taste was a distinct difference between the journal entries before and after the Nature Rx course. Five participants reported connecting with nature through "taste" in post-journal entries. For example, participant 29 wrote, "I enjoy the smell of fresh rainfall and tasting nature by drinking local teas."

Additionally, participants addressed connecting to nature with their bodies through physical activities like swimming and hiking more frequently in post-course journals than in pre-course journals. Participant 18 said, "Every now and then, I will sit outside in my hammock while doing my homework or just to relax outside. Other times I go on hikes up mountains to smell the fresh air of the wilderness and see the natural vistas from high above." These changes may be a result of the students being introduced to and participating in a variety of activities in Nature Rx, such as hiking, micro-adventures, forest bathing, and an outdoor tea ceremony.

2b. How do you feel about nature? How do you feel when you are in nature?

(Emotion). Subquestion 2b describes Lumber et al.'s (2017) emotion pathway. This CTN pathway describes how individuals develop an emotional relationship with nature that is deeply rooted in one's own feelings. It was common for participants to report feelings of happiness in pre-journals. However, in post-journals, these feelings moved beyond the basics of happiness. These positive emotions grew to reflect feeling more grounded and belonging in nature. Participant 30 stated in their pre-course journal, "I love nature. When I am in nature, I feel connected and calm. I feel at home." Their response to the same question post-semester changed as they reported,

> I feel that nature is sacred. We are all connected. I feel calm, grounded, and comfortable. I feel connected to the entire planet. Sometimes being in nature even connects me to outer space. I feel like I belong, and I am valued in nature, like a puzzle piece.

Additionally, the theme of love was present in both pre-and post-entries. "Love" was directly mentioned six times in pre-journals and nine times in the post. Feeling restored and relaxed in nature were themes also evident across the semester.

2c. What steps, if any, do you take to care for nature? (Compassion). Lumber et al.'s (2017) compassion pathway is represented in subquestion 2c. The pathway reflects one's development of empathy and caring for nature. Pre- and post-course journals included repetitive themes of "removing trash," "not littering," "practicing leave no trace," and "recycling". One difference presented in the post-course journals was the inclusion of more unique ways they care for nature, such as "take care of plants and pets," "use environmentally friendly products," and "create art out of scraps and trash". Participant 20 stated, "Always leaving a space clean is huge to me. I will always stop to pick up trash. I also like creating art out of scraps and trash to help reduce my own personal waste and find constant beauty." While all students responded to this

question with typical environmentally conscious behaviors like “recycling” at the beginning of the semester, three students expressed actions not stated by other participants in post-course journals. This might be attributed to the unique Nature Rx curriculum that encourages creativity and the expansion of what one may consider being nature.

2d. Have you ever found life meaning through natural landscapes or natural events? If so, please share. (Meaning). Subquestion 2d highlights the meaning pathway of CTN. Lumber et al. (2017) describes this pathway as individuals develop life meaning through natural landscapes or events. Pre-and post-course journals reflected minimal differences. Participants responded with yes or no answers. Of those who said yes, the experiences they had often were “transcendental” or “spiritual,” where nature provided them with reassurance and perspective. For example, participant 11 stated,

> Yes, many times in fact. Most of my deep and intimate experiences with God happen in nature. It was in nature that I found peace after my hard breakup. It was in nature that I felt God leading me to trust Him rather than pursuing a girlfriend for a while. It was in nature that I got clarity and pursuing the woman that is now my fiancé. It was in nature that I asked that very girl to marry me.

In sum, Nature Rx students’ journals did not differ substantially pre-to post-course however of those individuals who had experienced life meaning through nature were religious or transcendental.

2e. Where do you see beauty in nature, if at all? (Beauty). Subquestion 2e illuminates the beauty pathway of CTN development (Lumber et al. 2017). Developing awareness to nature’s beauty and appreciating it are key characteristics of this pathway. There was no difference evident in responses to this question from pre-to-post. Participants referenced finding

beauty in landscapes, like “mountains” or beaches, the sky, and in flowering plants both pre and post.

Question 3. Overall, how connected do you feel to nature? The aim of question 3 was to assess students’ subjective CTN. Participants who described having an existing CTN but saw a need for improvement were coded as having a moderate connection. Almost all participants were coded as having moderate or strong CTNs in pre- and post-course journals. For example, pre-course, participant 1 stated they felt as connected to nature as being “hooked up to the Los Angeles power grid on Christmas day while I’ve got a lightning rod on my head.” The description of their CTN was reflective of several others who shared strong connections in their pre-course journals. Participant 14 wrote, “I am one with nature. I am bound to it.” This is another valuable representation of pre-course responses. Participant 22 was the only student that described having “no connection to nature” before the course. Following a full semester of Nature Rx this same student reported that they had a “slight connection to nature.”

Though all except for participant 22 reflected having an established CTN the journal writings from pre- to post-semester showed that this connection was either maintained or strengthened after taking Nature Rx. 12 participants referenced Nature Rx specifically in the post-journal assignment; all of them credited their strong connection to nature to the course. For example, one student said, “Overall, I feel more connected to nature now than before the Nature Rx course.” And, another responded, “I feel more connected to nature than I have in a very long time. I credit this new bond to both this class, Nature Rx, and this school.” These journal entries describe Nature Rx’s impact on almost half of the participants. In conclusion, there was an overwhelming frequency in responses of moderate to high CTN both pre-and post-course. Even

then, several participants with an established CTN still reported an increase in their CTN after taking Nature Rx.

Discussion

The purpose of this study was to investigate whether Western Carolina University's (WCU) Nature Rx course fostered a connection to nature (CTN) in students. The quantitative findings did not support the hypothesis that Nature Rx would increase students' CTN. Therefore, we failed to reject the null hypothesis. Across majors, there was no statistically significant change in CTN from pre- to post-semester. The mean composite score for the pre-survey (M = 4.04) out of five shows that the average Nature Rx students had a strong CTN at the start of the semester. The minimum mean score in CTN for the sample studied pre-semester showed that even the least connected participant still entered the course with a moderate CTN according to NRS scoring (Nisbet et al., 2009). The high baseline in CTN reflects that students who selected this course had an established relationship with nature.

While Lankenau (2018) found that BiSci 3 increased students' CTN, I found that Nature Rx did not make a statistically significant difference in students' CTN by replicating his qualitative instrument. However, this result may be due to a ceiling effect. Albers (2017) states that this occurs when

> A measure possesses a distinct limit for potential responses and a large concentration of participants score at or near this limit. The research problem is that the effect of any changes to the dependent variables becomes less impossible to detect for relatively large changes to the independent variable. (p. 182)

With the average mean composite NR score pre-semester at M = 4.04 out of five for Nature Rx students, there is a limit to which students' survey scores can realistically increase post-semester.

A ceiling effect can impact a scale's sensitivity to change (Albers, 2017) as potentially seen here within these results. Like the quantitative, the qualitative results may also indicate a ceiling effect. Pre-course journals reflected established CTNs in all but one participant. Responses to the journal prompts overall were consistent pre to post, meaning students came into Nature Rx with a relatively strong CTN that was maintained or strengthened over the semester. Again, there can realistically only be a limited increase in CTN represented in their journals if their connections were strong, to begin with. Nature Rx could only have had so much of an impact on them.

There was minimal change seen in CTN within the qualitative findings as well. Overall, themes found within students' responses to the journal prompts were consistent pre- to post-for most questions. This reflects a limited difference in students' CTN as well as their development within the pathways (meaning, emotion, beauty, compassion, and contact) suggested by Lumber et al. (2017). It is still worth highlighting questions one and three. Question one addressed students' definition of nature, asking, "What does the word nature mean to you?" Responses in participant journals from pre- to post-semester were more robust and complex, showing a change in how some students define nature. This may reflect Nature Rx's ability to expand students' perceptions of nature through exposure to nearby nature and diverse activities to interact with differing intensities of natural stimuli, like viewing nature from a window to sitting in the woods surrounded by trees.

In addition, question 3 of the journal prompts asked students, "Overall, how connected to nature do you feel?" 97 percent of participants described having a moderate to strong CTN both pre- and post-semester. Only one student stated they had no CTN in their pre-course journal. Their CTN increased over the semester, with the same student saying, "I have a slight connection to nature," following the completion of Nature Rx. No student reflected on feeling less CTN

from pre to post. In fact, almost half of all participants referenced the class Nature Rx specifically in their response to this question as the reason for their improved CTN. This implies that Nature Rx was effective in maintaining or strengthening students' CTN. While there was an abundance of responses of moderate to high CTN both pre-and post-course several participants still reported an increase in their CTN after taking Nature Rx.

While it is likely that these results indicate a ceiling effect, one may consider why this happened. As a liberal studies course, this study's sample was self-selecting. Students are not required to take Nature Rx specifically; however, they must take one of several courses within the same P4 humanities category. This includes the following 25 other courses:

- ENGL 203: The Literature of Rebellion, Revolution, and Resistance
- ENGL 290: Literature & The Sacred
- ENGL 368: Film Genres
- LAW 201: Individual Rights
- PAR 330: American Wilderness Ethics & Aesthetics
- PAR 201: Philosophy of Sex & Love
- PAR 250: Origins of Early Christian Traditions
- HIST 271: Religion in America
- PAR 320: Philosophical & Religious Classics: Jesus & Paul
- HIST 281: Transformations in European Religious History
- ENGL 333: Introduction to Shakespeare
- SM 340: Sport Ethics
- ENGL 209: Past Times: Literature & History
- PAR 121: Religious Ethics and Moral Problems
- PAR 309: Philosophy in & of Film
- PAR 320: Philosophical & Religious Classics: Feminism
- PAR 102: Western Moral Traditions
- LAW 412: Business Ethics & Corporate Responsibility
- ENGL 352: The Journey in Literature
- ENGL 206: Literature of Place
- PAR 146: Western Religious Traditions
- PAR 101: Western Philosophical Traditions
- PAR 304: Ancient Greek Thought
- PAR 320: Philosophical & Religious Classics: Afro-Caribbean
- PAR 332: Biomedical Ethics & Social Justice

Students are given a wide variety of courses to select from. Nature Rx is unique amongst the list as it is the only Parks and Recreation Management class offered in P4: humanities

(Liberal Studies Program, n.d.). Any student that likes nature and being outside would likely choose this course over the other options listed. Therefore, these students may come in with a pre-established CTN, as seen in this study's population sample.

Another possible reason for this ceiling effect is even more general. Western Carolina University (WCU) is a school located within the mountains of NC. No public universities in the state's western region offer the same mountainous environment and outdoor recreational opportunities as WCU. One may suggest that WCU, as a school, has geographical characteristics and extracurricular offerings that cater to students who enjoy nature, mountains, or being outdoors. Therefore, this study's sample may be considered biased as WCU students potentially attend this school because of their pre-established relationship or affinity with nature. Both the students self-selecting to take Nature Rx as well as attend WCU reflects possible rationale for the ceiling effect seen within both quantitative and qualitative results.

The roles of statistical and practical significance within this study are worth noting here as well. I initially sought to address the statistical significance of the effect of taking Nature Rx on students' CTN. While the results were insignificant statistically, this does not mean the study is without practical significance. Practical significance relates to the magnitude of an effect (Rosen & DeMaria, 2012). It addresses whether the effect has valuable implications in the real world, which is unidentifiable if looking at statistical significance alone (Rosen & DeMaria, 2012). There is potential for the study's results to have practical significance as the effect of the class pre-to post-semester led students to nurture relationships with nature. Within the field of experiential and outdoor education, this study is an exciting piece of work that may lead other higher education institutions to pursue courses similar to Nature Rx.

Recommendations and Future Work

CTN and higher education must be further investigated. Lankenau and I's (2018) work should be replicated by other colleges/universities and across different class types. This would allow for more insight into both Lankenau (2018) and my results. Deciphering what about my population, the course, the variable studied, or the process adopted that led to generally insignificant results is important for further work in environmental and public health. While the current study looked at connection to nature and saw no statistical significance, other outcome variables may show change across the semester of Nature Rx. Environmental stewardship, pro-social behaviors, time spent in nature, or Leave No Trace ethics may be possible alternatives to testing connection to nature. The variable of interest within this study may not be the right variable; therefore, I suggest that future researchers looking to address similar class outcomes investigate these possibilities. Outcomes-based research was used in the current study. Benzel refers to this as an approach to research where one simply seeks to prove a point (2019). I recommend that future researchers consider a contrasting method, like a process-based approach, to address these unknowns, as it allows for unbiased processes and a look at the development of a variable across time rather than its outcome (Benzel, 2019).

I also recommend that researchers who replicate this study expand the qualitative journal prompts. Specifically, I would include an additional question within the post-course journal that inquires how the specific course tested impacted participants' CTN. This was a limitation of this study as participants were never directly asked if Nature Rx changed their CTN over the semester. The inclusion of such a question would provide researchers with direct qualitative evidence of participant CTN differences pre- to post-semester in relation to the class.

Conclusion

This research exists as a further step in understanding, as Lankenau (2018) suggested, if and how a higher education curriculum can foster a CTN when interwoven into the goals and approach of a class. While this study's results on Nature Rx were relatively insignificant, this research still adds to a growing body of work as we progress in understanding how to foster CTN in adult populations. The hope is that more work will be done on different classes and college campuses to make a more comprehensive consensus. With more knowledge, we may be able to make lasting positive changes in nature-related higher education classes, adult student health, and environmental advocacy. Without such progress, we will not be equipped to handle these exponentially growing crises. Improving the health and well-being of higher education students as well as increasing pro-environmental behaviors through fostering greater CTN, is a critical endeavor to sustain all living things now and for years to come.

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Appendix A

Nature Rx Syllabus (Singleton, 2022)

"We need the tonic of wildness."-Henry David Thoreau
"If nature contact were a medication, we would be prescribing it to everybody."
-Howard Frumkin, Dean of the School of Public Health at the University of Washington

Course # & Title: **PRM 365: Nature RX**
Credit Hours: **Three (3)**
Liberal Studies: **P4 Humanities, Upper-Level Perspective**
Class Location: **Reid 113B (classroom), ZOOM, outside locations**
Time: **3:30pm-6:20pm**
Instructor: **Debby Singleton, M.A**
Preferred Pronouns: **she/her/hers**
Office: Office Location: REID 122-J or ZOOM
Phone: **828-227-3971 (Office)**
Email: **singleton@wcu.edu**
Office Hours: **By appointment. I welcome the opportunity to meet with you 1-on-1, in person or over ZOOM. Please email me for an appointment.** ☺

Course Description: Nature RX explores the connection between nature and wellness. Students will gain a better understanding of the research associated with the social, emotional, intellectual, and physical health benefits of engaging in, and with, nature. This understanding is developed through participating in easy, accessible micro-adventures; interactive labs to explore the science behind the research; nature-based creative, mindfulness activities; and guided discovery assignments. The class helps students to develop a mind-body connection to nature with a focus on overall wellness and stress management.

Land Acknowledgement
This class, Nature Rx, actively participates on the ancestral homelands of the Eastern Band of Cherokee Indians.
The Western Carolina University campus is situated within the ancestral homelands of the Eastern Band of Cherokee Indians. At WCU, our work seeks to embrace and connect to this Cherokee landscape as we work to reinforce our mission. We will work to actively engage our community with the extraordinary indigenous identity and culture of this special place.

The Importance of this Course:
Does nature make us happier, healthier and more creative? That is what we explore in this course. Within one generation, we have gone from being connected to the outside world, to present day spending up to 7 hours a day on screens. What happened? Obviously, we are continuing to live through a global pandemic, but even before covid-19, our overall health and well-being was declining. This decline in health includes: increase in obesity, increase in ADHD,

increased in myopia (nearsightedness), more chronic diseases in younger people, more inflammatory diseases, increased depression and anxiety, decreased ability to manage our personal stress response, increased loneliness, loss of social connections, less resiliency and grit, and finally, nature deficit disorder. This course introduces students to the scientific investigations of the nature-brain connection and provides them with the knowledge, skills, and tools to implement the science into their everyday wellness practice.

To quote Dr. Eva Selhub and Dr. Alan Logan from their book, *Your Brain on Nature*:
"The brain is absolutely influenced by nature… The mortality of individuals, nations, and even the planet itself is dependent on the recognition and acceptance that nature is part of us. Our perception of stress, our mental state, our immunity, our happiness, and our resiliency are all chemically influenced by the nervous systems and its response to the natural environment."

In recent decades, a number of research studies have been undertaken to both increase our understanding and provide scientific validation of the numerous ways in which spending time in nature contributes to our well-being. Two benefits of particular interest to college students are an increased ability to concentrate and a reduction in stress levels in response to time spent in green spaces. Other benefits include reduction in blood pressure and resting heart rate; increase in creative problem solving; increase in physical activity levels; increase in emotional and mental well-being; increase in resiliency; improved strength, balance, and coordination; improved distance vision; increase in Vitamin D levels; encourages social interactions; and increase awareness of sense of place.

So here we are, surrounded by an abundance of nature and a semester to explore the research, opportunities, and lifetime benefits. As mentioned above, my goal for the class is to provide students with the knowledge, tools, and skills to incorporate nature or time outside into their daily wellness routine. And to feel confident in sharing this new found passion and knowledge with others.

Course Objectives:
By the end of this course, students will be able to…
1. Explain why nature makes them happier, healthier, and more creative through critical analysis of research, guided assignments, and readings.
2. Practice and reflect upon a variety of outdoor, nature-based activities which are easily accessible and enjoyable to the student.
3. Apply the research and science focused on the benefits of nature into personal practice to enhance their overall health and well-being.
4. Encourage and assist others to get outside and enjoy the benefits of time spent in, and with, nature.

Required Text: Williams, F. (2017). *The Nature Fix: Why Nature Makes Us Happier, Healthier, and More Creative*. W.W. Norton & Company Publishers. Available for purchase in WCU Bookstore, on Amazon, or through independent booksellers. Additional required readings will be provided digitally online.

The Nature Fix by Florence Williams is a bold investigation into nature's restorative benefits. Ms. Williams is a contributing editor for *Outside* magazine whose work has appeared in the *New York Times* and *National Geographic*. The book examines the research associated with the wellness benefits of nature through stories that highlight the science and the scientists from a global perspective. The use of this text will help us explore the value of nature on the human condition.

If you are interested in learning more about Florence and her connection to nature, check out this video https://youtu.be/m8hHa7H_0nY. If you are reading this section before the end of the second week of class, send me an email with the subject line, "AWE", and include a photo of a personal micro-dose of awe you have encountered recently, caption it, and explain why you felt awe. If you do this, I will award you five points extra credit added to your final points total for the class. Thank you for reading the syllabus.

Required Attire & Gear:
**This is an "all weather class". Meaning; "there is no such thing as bad weather, only poor clothing choices."
**The instructor will provide suggestions and resources for attire and gear which can be purchased, inexpensively, locally, or repurposed from student's existing personal items.

1. Comfortable, closed toe, grippy sole shoes. These can be any type of athletic shoes, hiking boots, low hikers, or trail running shoes, just make sure they have a lot of support and a grippy sole. You must be able to walk/hike comfortably in these shoes for a minimum of one hour and possibly up to 3 hours during class periods. These should be shoes you don't mind getting dirty. ☺
2. Comfortable, moisture-wicking, athletic type apparel. This includes tops and bottoms. The majority of our class time will involve some type outdoor activity, so please dress in "layers".
3. Waterproof or at least water-resistant outer layer (jacket). Waterproof or water-resistant pants are also encouraged, but not mandatory.
4. Depending upon the season and the weather, you will need the following: warm hat, gloves, cap with a brim, scarf, or bandana. A small umbrella will also be handy.
4. Small daypack and water bottle.
5. Small notebook and pen to use during outside guided discovery classroom time and for personal journaling for a variety of assignments.
****Masks:** Each student is required to wear a face mask properly (above your nose, cover your chin, and secured behind ears or head) at all times during face-to-face classes, even while outside when we are close together for teaching moments.

Physical Fitness Requirements for this course: This course requires participants to exercise and move at the best of their ability level. Activities may include walking, hiking, stretching, yoga, and a variety of outdoor activities. If you are uncertain about your ability to participate, please speak with the instructor. Accommodations and modifications will be accepted, offered, and encouraged.

Technology Required: All students should have access to a computer with audio and video to participate in ZOOM virtual classes when scheduled. In addition, either a cell phone or digital

video recorder will be helpful for creating and producing videos for several of the learning module assignments. A list of FREE applications that may be used in the class will be provided to students throughout the semester.

Meeting Day, Time & Classroom: This course is structured as a HYBRID with a combination of face to face, weekly class meetings, and online learning modules. Our weekly face to face classes will meet in either our designated on-campus classroom, the TDC Outdoor Classroom, the WCU Pavilion behind the softball field or other outdoor venues on and off campus. Some weekly classes may meet over ZOOM to accommodate guest speakers.

COVID PANDEMIC PLAN: SPRING 2022, our game plan is to have face to face classes with proper physical distancing and safety protocols in place to reduce transmission of SARS-CoV-2 (coronavirus) and the variants, which causes Covid-19. If at any point during the semester, the risk of transmission increases, the in person portion of the class will move to a virtual format via ZOOM. Virtual classes may also be scheduled due to unforeseen circumstances. If a student needs to quarantine and not attend class in person, they will need to contact the instructor for alternatives.

Course Logistics & Schedule:
• Lecture classes will meet in our designated classroom space.
• Several classes will meet at the picnic pavilion behind the softball field, the TDC outdoor classroom, Reid Main Gym, or other designated spots around campus.
• All class meetings will include an outdoors, active component.
• Some class periods may meet off campus.
• Complete course schedule can be found in Canvas.
• All assignments will be submitted online in Canvas.
• All lecture content and learning modules are located online in Canvas.

Course Topics:
Students will explore the historical context, current issues, and the body of research surrounding the benefits of time spent in nature, with emphasis on the physiological and psychological effects. Topics include, but are not limited to:
1. Introduction: What is Nature RX & Epidemic Dislocation from the Outdoors?
2. The Biophilia Effect, Nature Deficit Disorder, & Other Nature-Based Research
3. Understanding the Nature Rx Theories: Stress Reduction Therapy & Attention Restorative Therapy
4. Cognitive Fuel, Brain Networks, & Flow State
5. Nature Through the 5 Senses (Vision, Smell, Taste, Touch, Hearing)
6. Nature Dose Response for Mind-Body Wellness
7. The 3 Day Effect: Nature on our Brain
8. Exploration of Shirin Yoku (Forest Bathing/Therapy)
9. The Connection between Nature Rx and Social Justice, Equity, Diversity, & Public Health
10. Leave No Trace Outdoor Ethics & Principles
11. Micro-Adventures Preparation, Safety, & Implementation
12. Nature as a Personal Wellness Practice

Course Assignments:
Each of the course assignments is a building block to assist students in exploring ways to implement nature as wellness research into practical personal practice for this course and for a lifetime.

Assignment Overview

Assignment	**Due Date**	**Points**	**Course Objective**
Learning Modules	Weekly, Wednesdays at MIDNIGHT	300	1, 2, 3, 4
Personal Field Experience & Reflection	One week post experience No later than last week of classes	200	1, 2, 3, 4
Nature Rx Challenge	2 check ins during semester. Complete assignment: end of semester (see course calendar)	200	1, 2, 3, 4
Nature as Wellness Prescription	End of semester (see course calendar)	200	1, 2, 3, 4,
Class Participation & Attendance		100	
	TOTAL	1000	

5. **Learning Modules (300 points)**

Since this course is focused on recognizing behaviors and defining choices that affect their lifelong well-being, students will be active participants in content learning modules through a variety of interactive assignments and evaluation methods. These methods include: discussion forums, tasks such as creating a short video or infographic, scientific inquiry experiments, quizzes, and small group discussion/presentations. The assignments and evaluations will focus on providing students with the knowledge, skills, and abilities to develop and implement their own personal nature wellness practice. The learning modules will have a dual layer focus in the hybrid model of the course.

First, the assignments and evaluation methods will be completed individually by the student. These are due **Mondays (by midnight) or Wednesdays (by midnight)** *If a learning module requires a discussion forum post, the original post is due Monday by midnight.

Second, during the face-to-face component of the class **(Thursday afternoon/evening),** students will apply or dig deeper into the learning module content through a variety of methods. This may include being divided into small "walk-talk" groups where they will discuss the learning module content and develop an overall summary of the major themes, take-a-ways, findings, and how they will personally implement the information into their own personal nature wellness practice. The discussion summary will be shared with the rest of the class when the "walk-talk" is complete. Or, students may take part in scientific inquiry experiments to replicate research discussed in the learning module. Or, students may actively participate in a guided discovery

assignment which explores the theme of the learning module, such as identifying fractals in nature and examining the restorative benefits of viewing them.

There will be 10 learning modules, with the assignments and evaluation methods adding up to an overall total of 300 points.

5. **Personal Field Experience & Reflection (200 points)**

To assist in the development of their own personal wellness practice and application of course content, students are required to participate and reflect upon an experience in nature that is outside of our class-time.

"The land is the real teacher. All we need as students is mindfulness." -Robin Wall Kimmerer author *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teaching of Plants.*
Participation= 50 points
Reflection = 150 points

Participation: The Personal Field Experience can be completed by one of the following options:
(1) Participate in a nature-based, recreation opportunity provided for and led by **Base Camp Cullowhee (BCC)** (the university's outdoor program). BCC offers programs and trips throughout each semester. It must be an OUTSIDE trip/program. There may be a fee attached to some programs. For more information: https://www.wcu.edu/experience/campus-recreation/base-camp-cullowhee/index.aspx
(2) Research and implement **their own Personal Field Experience Trip**. For this option, students are required to spend at least 3 hours participating in an outdoor activity of their choosing in a location that is new to them. Students may schedule a time to meet with the instructor to discuss options and any questions they may have.*See additional instructions for Personal Field Experience Trip below red.
(3) Attend one of the **Instructor or Teaching Assistant Led Hiking Trips**. Depending upon availability and covid-19 safety protocols, the instructor or teaching assistants may offer 1-2 hikes during the semester.

Reflection: Prior to and after completing the Personal Field Experience, students will be required to write a comprehensive, introspective reflection.

a. **Pre-Reflection**: This portion of the writing assignment should be completed during the days leading up to the field experience. ***This will be the first section of the reflection paper*.
(1) Which field experience are you planning to participate in, why did you select this one? If this is a personal field experience of your design, please provide background information on what you plan to do, where you are going, and who is going with you.
(2) Describe your feelings about participating in this field experience.
(3) Describe what you know about the location you will be visiting and the activity you will be participating in. If this is a personal field experience of your own design: provide a map, suggested itinerary, safety protocols you will take; gear you plan to bring.
(4) What do you hope to gain or learn from this experience?

**Have journal, writing utensil, camera/phone, clothes, water, and snacks ready for the field experience.

b. **During the Field Experience**:
(1) Participate fully and at the best of your ability.
(2) Record thoughts and observations in your journal.
(3) Record information concerning the weather, what you ate, were you dressed appropriately, how are you feeling physical, mentally, emotionally, spiritually.
(4) Record any insights gained from the experience and how it relates to content we have covered in the course.
(5) If appropriate, take photos of your surroundings, the activity, and other participants.
(6) If appropriate, sketch-draw-diagram-paint something you see or want to remember about the experience.
(7) Pack out your personal trash/litter. If appropriate, pick up any trash/litter you find and dispose of properly.
c. **Post-Experience Reflection**: You will complete this portion within **24-48 hours after** you have finished the experience. The completed assignment is due within **ONE WEEK of the Experience.**
(1) Describe how you felt while participating in this activity, make special note of the physical, mental, emotional, or spiritual aspects.
(2) Your observations. Notes about weather, food, clothing, the area, things you saw, experienced. *Include pictures or drawings if applicable.
(3) Reflect on how you applied, or understood, or experienced, or made a connection to the content in this course during this field trip. Provide specific examples in relation to our text, your supplemental text readings, learning modules, and class discussions.
(4) *If applicable: Describe how the group, class, or individuals functioned during the activity.
(5) What did you gain or learn from this experience?
(6) Would you return to this location in the future? Why or why not? Would you participate in this activity again, why or why not?
(7) Parting words, thoughts, quotes to summarize the overall field experience.
(8) Embed any pictures of the experience with descriptions.

Reflection Piece Requirements for submission:
• Please compose your reflection in **complete sentences and paragraph format incorporating all of the required elements described above**. If you drew any diagrams or pictures, you may copy and scan them into your reflection piece. Embed photos to document the activity.

*Reflection should be typed, 12 point font, 1" margins, double-spaced. Quality is preferred over a certain number of works or page length. Save document as, "lastname_fieldexperiencereflection.docx". Submit through Canvas in appropriate assignment module within one week of the field experience completion.

The Reflection Paper should include proper in-text citations and a reference list utilizing **APA format especially to support #3 in the Post Reflection section.** A title page is NOT needed. A running head is NOT needed.

The Personal Field Experience & Reflection is due within one week of personal completion and no later than the last week of classes.

5. **Nature Rx Challenge (200 points)**

One of the goals of this course is to introduce students to a variety of activities and strategies to personally enjoy the outdoors and experience the benefits of time spent in nature. Students are required to complete 10 nature-based activities of their choosing, from a selection of 40+possibilities. The selection of activities provides opportunities for students to explore the natural areas on/off campus and their own backyard, participate in micro-adventures, put into practice the research discussed in the course, explore nature through their senses, discover activities that can become a part of their personal wellness practice, and encourage family and friends to participate with them.

To encourage accountability, students will be asked to complete a short assignment, twice during the semester, which monitors their progress with the challenge. These "check in" assignments are to encourage students to work on the challenge throughout the semester and not procrastinate until the end to try and complete 10 activities.

"In the space of a century, the American experience of nature has gone from direct utilitarianism to romantic attachment to electronic detachment." – Richard Louv, author of *Last Child in the Woods*.

To receive full credit for the assignment, students must complete the required tasks for each AND an overall reflection paper. Complete sentences are required for this portion of the assignment:

1. Nature Rx Challenge descriptions (which ones did you complete?)
2. Day, date, time, location, people you might have been with
3. Special instructions from the challenge
4. Selfie or image of activity if requested and applicable.
5. Describe how information gained from **the course** assisted you in completing this assignment or helped you to understand a concept more completely.
6. Describe how information gained from **your Supplemental Text reading** assisted you in completing this assignment or helped you to understand a concept more completely or strengthened a connection from the reading to the experience.
7. Overall summative reflection on the Nature Rx Challenge and how you will apply what you have learned and experienced to your personal wellness practice.

The Nature Rx Challenge is due at the end of the semester, with at least 2 in-semester check in assignments.

Below is a sampling of Nature Rx Challenge options, please refer to Canvas for the complete listing of options.

Study or work on an assignment outside one day. Record when, how long, where and how it made you feel.	Pick an evening to watch the sunset from a safe advantage point. Record what you saw, felt, experienced. Take a "selfie" of yourself participating.	Visit the Jackson County Greenway and walk, run, ride, scoot, etc. the entire trail. Record what you saw, felt, experienced. Take a "selfie" of yourself participating.	Find a wooded area, sit or lie down, and "listen". Close your eyes and take deep breaths. Do this for 30 minutes, record what you hear and how it makes you feel.	Eat a meal outside one day. Record which meal, when, where, who you were with, and how it made you feel.
Gather some art supplies, head outside. Draw, sketch, paint something in nature. Record when, where, how it made you feel and include an image of what you created.	Go outside on a clear night. Find a spot with a good view of the sky. For at least 30 minutes, watch the stars, relax. Record what you see and how this makes you feel.	Turn off your cell phone, computer, and all electronic devices for ONE Hour. Spend that hour outside. Afterwards, record, when, where and what you experienced.	Prior to a test or working on a difficult assignment, take a 30 minute walk outside. Record how you felt before and after; plus if it made a difference on how you performed.	Find a "fractal" image in nature. View this image for at least 15 minutes. Take a picture of it or draw it and record when, where and how it made you feel.

Take a friend for a walk/hike in nature. Go for at least one hour. Record when, where and how you both felt afterwards. Take a "selfie" of yourself participatin g.	Meditate, sit quietly, rest or "ENO" (hammock) someplace on campus for at least one hour. Take your RHR before and after the hour. Record what you did and how it made you feel.	Semester Long Task: Use biophilic design to turn your living space into a healthy, nature influenced space. At the end of the semester, describe what you have done and why (related to research on biophilic design). Provide photos of the changes and end result. Think of it as Biophilic HGTV.	Visit the Great Smoky Mountains National Park and walk/hike/ explore outside for at least one hour. Record when, where, what you 82xperienc e. Take a "selfie" of yourself participati ng.	One Week Task: Keep an indoor/outdo or illustrated or written journal. Draw what your see Out the window or when outside OR white about your observations of the nature around you. You do not need to share your journal, just give a brief synopsis and an example or two of your work.

5. **Nature as Wellness Prescription (200 points)**

Paracelsus, the 16th century German-Swiss physician, wrote: "The art of healing comes from nature, not from the physician." Of course, he had no idea that the world would be so driven by technology and that people would become disassociated with their natural surroundings. That is why the cumulating assignment for the semester is the development of your personal "Nature as Wellness Prescription". This is a personal wellness road map that applies the lessons learned from the course, the discovery of activities and micro-adventures you enjoy, and the goal to put everything into practice.

Using the template outlined below, develop your own personal nature as wellness prescription that can be used as part of your personal wellness practice now and in the future. Answer each statement/question completely with detail and connection to the concepts we have covered in the course. There is also some freedom to be creative with your prescription. Yes, it does need to be well written and descriptive, but it can also include photos, drawings, quotes, clip art, memes, gifs, and your own personal voice. You could even include a "mock prescription" (like you get from a physician) as part of your explanation.

Please create using MS Word, save as a word document (.docx), 12 point font, double-spaced, APA formatting. When uploading to Canvas, make sure the document is saved with your last name in the title. Example: "singleton-NatureRx.docx".

The template for the Nature as Wellness Prescription includes:
a. Name of student on a Title Page: include your name, PRM 365 Nature Rx, semester, and your favorite quote from "The Nature Fix" or another source this semester. *Optional: include a picture of yourself enjoying time in nature.
b. Description of activities, micro-adventures, strategies, and/or practices which you will implement to use Nature as Wellness in your personal life. **Explain why these were chosen.** Use sources from the semester and your **Supplement Text reading to support the "why".** In text citation using APA formatting.
c. **Dosage/Frequency:** How much and how often (time related) will you participate or practice these activities, micro-adventures, strategies, or practices? **Describe for EACH element.** Use sources and your **Supplement Text reading (if applicable)** from the semester **to support the "why".** In text citation using APA formatting.
d. Side Effects: Describe the personal health benefits of your prescription. Use research and information from this course to support your points. Use sources from the semester and your **Supplement Text reading (if applicable) to support the "why".** In text citation using APA formatting.
e. ***Optional**, yet encouraged: photos, charts, graphs, quotes, clipart, artwork to support your plan.
d. **Reference list** utilizing APA formatting.

All prescriptions should include proper in-text citations and a reference list utilizing **APA format**.

Due date: During final exam period for the course, but you are welcome to submit earlier!
Grading Rubric can be found in Canvas.

5. **Participation & Attendance (100 points)**

Strive to attend all classes on time, having taken in the assigned readings, viewings, and listening prior to our class time. You are invited to actively contribute to course discussion as responses, reflections, and questions. Participation and interaction are essential in this course. All forms of participation are considered – verbal and nonverbal, cognitive, behavioral, creative, and experiential.

Flexibility, openness, respect, and consideration for one another in our shared spaces can benefit our learning community as well as your growth as a student and human being. Some of these skills include acceptance, awareness, empathy, compassion, active listening, respect of boundaries, and openness to feedback and discussion.

Attendance and participation are integral to course engagement. Your presence adds to our collective learning experience. All classrooms, whether inside or outside, are active learning labs for engagement of course material. I am not the sage on the stage, but rather your guide by your side. Your ability to attend class and complete the learning modules, ensures that you will be

engaged in a dynamic learning experience that cannot be fully replicated or communicated without direct experience.

Our class meets for 13 sessions in total. Three or more absences is a 23% learning loss that can significantly impact you and your developing skills and personal practice of the course content. If you are concerned about your ability to attend all sessions of this course, please reach out to the instructor. If you are reading this section before the end of the second week of class, send me an email with the subject line, "Water Bear, I Care", include an image of a tardigrade and tell me why you think I asked for a picture of this thing and how it might relate to this course. I will award you one percentage point added to your final grade percentage. Thank you for reading the syllabus.

This course employs a flexible attendance policy in order to accommodate students who are ill or required to isolate during the duration of this class. This policy relies on the honor and good faith of all university community members. If you are exhibiting symptoms of COVID-19, such as cough, fever, shortness of breath, muscle pain, headache, chills sore throat, loss of taste or smell… you should not attend in-person class. The same holds true for those of you have been in close contact with others who have symptoms, or who are engaging in self-quarantine at the direction of a healthcare professional. Students who miss class due to COVID-19 or quarantine, are expected to complete assignments, discussions, and class experiments in a timely manner.

****Note on personal responsibility:** As we enter the third year of the Covid-19 Pandemic, I encourage each of you to accept personal responsibility for your actions to ensure you stay healthy and that you consider the health and well-being of those around you. This personal responsibility includes wearing a mask properly, getting vaccinated and boosted, calculate your risk of viral exposure and take precautions, and think about how your actions affect others. If we all practice and encourage personal responsibility, we can enjoy participating together, in person, throughout the semester.

Points	**Summary of Participation & Attendance Points**
100	Fully engaged, active participation and contribution, entire semester and/or 2 absences or less.
80	Above Average participation, engaged and contributes at least 75% of the time and/or 3-4 absences
70	Average participation, engaged and contributes at least 50% of the time and/or 5 absences
50	Below Average participation, engaged and contributes at least 25% of the time and/or 6 absences
0	Poor participation, not engaged, missed more than 6 classes

Grading and Evaluation Procedures
Criteria for evaluation in this class include ordinary standards of good writing (clear expression; accurate punctuation, grammar, and spelling; well organized) and meeting specifications of individual assignments. Assignments must be submitted in on or before announced deadlines for full credit.

Assignment Policies
As stated above, due to the time-sensitive nature of the learning module assignments and discussion forums, no late work will be accepted **without prior communication**.

5. Class assignments are due in Canvas on the due date listed. Late assignments will be penalized

(1 day late = minus 10% of total grade; 2 days late = minus 20%; etc.) Assignments will not be accepted past 5 days late. If you have extenuating circumstances, please contact me to discuss options.
2. Use your spell-check, grammar, and thesaurus tools, which are provided in all word document software. I deduct points for errors, PROOF YOUR WORK!
3. Assignments will be due in Canvas at the end of each learning module or assignment module. **Emailed assignments will NOT be accepted.**

Grading Scale

A+	101%+		
A	93-100%	C	73-76.9%
A-	90-92%	C-	70-72.9%
B+	87-89.9%	D+	67-69.9%
B	83-86.9%	D	63-66.9%
B-	80-82.9%	D-	60-62.9%
C+	77-79.9%	F	Below 60%

Risk Awareness: Students should be aware that physical activity is expected as partial fulfillment of the requirements of the class. This includes participation in a variety of outdoor activities. Students should make the instructor aware of any physical limitations that will limit participation in the class. Students will be required to complete a Risk Awareness form at the beginning of the term.

An emergency action/risk management plan will be created for each semester and shared with the PRM Program Director and Human Services Department Chair. The instructor is certified in Wilderness First Aid and will carry a comprehensive first aid kit for all outside classes and field trips. The instructor will carry a cell phone and a satellite mobile device when warranted to

access emergency help if needed during outside class periods and field trips.

Class Culture:
As a class of engaged learners, we agree that we will…
Value and respect different opinions, different experiences, different ability levels, as well as the diversity that exists among us.
Voice our passions, and not censor ourselves. By this we mean that we want to ensure that we can and should be able to share our thoughts and experiences without interruption *especially* if our perspectives are different from the class norms, expectations, or experiences of others.
Encourage questions and clarification.
Be willing to try new experiences at the best of our ability and with a positive attitude.
Show support, respect, and attention when our classmates are speaking, sharing, and leading.
Be active participants and come to class prepared.
Log onto Canvas at least 4 days a week to check our course shell, assignments, graded items, and schedule.
Set aside 5-8 hours a week to complete course learning modules, reading assignments, reflections, participate in discussions, and work on the semester long assignments.
Avoid missing deadlines and due dates by starting learning modules early and planning to submit work before the due date.
Be respectful to each other, the teaching assistants, and the instructor.
Refrain from participating in unhealthy behaviors while class is in session face to face. This includes the use of alcohol, e-cigarettes, smokeless tobacco, cigarettes, vaping and juul devices.
Work cooperatively with each other on group discussions.
Adhere to safety protocols and equipment cleaning guidelines established by WCU and the PRM Program to reduce transmission of SARS-CoV-2 (coronavirus).

As your instructor, I agree to…
Respond to emails within 24 hours Monday-Friday (weekend response may vary).
Provide clear, concise, constructive feedback on all graded items.
Return graded assignments within 2 weeks of submission.
Be open to your ideas and suggestions as we navigate a hybrid, face-to-face class with an outdoor activity component during a pandemic.
Provide a safe learning space for you to engage and learn physically, emotionally, and intellectually.
Provide a funny anecdote or joke during each class period. If you are reading this before the end of the second week of classes, and want some extra credit, send me an email with the subject line, “Joke for Debby”, and include your best nature related joke. I’ll award you five points extra credit on your total points for the semester. Thank you for reading the syllabus.
Keep you informed of any changes or updates to our course schedule, class logistics, safety protocols, or changes in assignments.

Netiquette Guide:
A hybrid-online class format is still a class and certain behaviors are expected when you communicate with both your peers and your instructor. The purpose of this guide is to help you be a more effective and successful student when communicating in chat rooms, discussion boards and part of your online learning activities in this course.

1. Treat your instructor with respect.
2. Always use your professor's proper title: mine is "Ms." Or "Professor".
3. Use clear and concise language. Be respective of the reader's time and attention.
4. Avoid using slang terms such as "wasup?" and texting abbreviations such as "u" instead of "your".
5. Use standard fonts that are optimized for online reading along with consistent and readable size (12-14 point).
6. Avoid using the caps lock feature AS IT CAN BE INTERPRETED AS YELLING.
7. Limit and possibly avoid the use of emoticons. Not everyone knows how to interpret them.
8. Be causing when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken literally or offensively.
9. Be careful sharing personal information online (both yours and other's).

Discussion Board "Netiquette" and Guidelines:
When posting on the Discussion Board, you should:
1. Make posts that are on topic and within the scope of the course material. If necessary, re-read the instructions from your instructor.
2. Take your posts seriously and review and edit your posts before sending.
3. Be as brief as possible while still making a thorough comment.
4. Always give proper credit when referencing or quoting another source.
5. Be sure to read all messages in a thread before replying.
6. Don't repeat someone else's post without adding something of your own to it.
7. Avoid short, generic replies such as, "I agree". You should include why you agree or add to the previous point. The point of a discussion in an online course is to help you and your other students learn through in-depth consideration of important topics.
8. Always be respectful of others' opinions even when they differ from your own. When you disagree with someone, you should express your differing opinion in a respectful, non-critical way.
9. Be open-minded as that is one of the major points of participating in an open classroom discussion.

E-mail Etiquette: Electronic mail to and from your "@catamount.wcu.edu" address is the preferred method of communication. Please follow common e-mail rules:
1. Use your @catamount.wcu.edu email address
2. Use a short and accurate subject header
3. Use a proper salutation (Hello, Good Morning, Greetings, etc.)
4. Introduce yourself in the first paragraph (if needed)
5. The message body should be written in a concise and clear manner. Please do not BS or ramble. Get to the point.
6. Leave-taking (departing farewell) should be appropriate. (Respectfully, Yours Sincerely, Take Care, etc.)
7. Sign your email with your full (First and Last) name
8. Proofread for content, spelling and grammar.

Appendix B

Pre/Post Nature Relatedness Scale Survey

Name: _____

Age: _____

Major: _____

Instructions: For each of the following statements, please rate the extent to which you agree with each statement, using the scale from 1 to 5 as shown below. Please respond as you really feel, rather than how you think you should feel, or how "most people" feel.

1	**I enjoy being outdoors, even in unpleasant weather.**	**1 ____ 2 ____ 3 ____ 4 ____ 5 ____**
2*	Some species are just meant to die out or become extinct.	1 ____ 2 ____ 3 ____ 4 ____ 5 ____
3*	Humans have the right to use natural resources any way we want.	1 ____ 2 ____ 3 ____ 4 ____ 5 ____
4	My ideal vacation spot would be a remote, wilderness area.	1 ____ 2 ____ 3 ____ 4 ____ 5 ____

5	I usually think about how my actions affect the environment.	1 ____	2 ____	3 ____	4 ____	5 ____
6	I enjoy digging in the earth and getting dirt on my hands.	1 ____	2 ____	3 ____	4 ____	5 ____
7	My connection to nature and the environment is a part of my spirituality.	1 ____	2 ____	3 ____	4 ____	5 ____
8	I am very aware of environmental issues.	1 ____	2 ____	3 ____	4 ____	5 ____
9	I take notice of wildlife wherever I am.	1 ____	2 ____	3 ____	4 ____	5 ____
10*	I don't often go out in nature.	1 ____	2 ____	3 ____	4 ____	5 ____
11*	Nothing I do will change problems in other places on the planet.	1 ____	2 ____	3 ____	4 ____	5 ____
12	I am not separate from nature, but a part of nature.	1 ____	2 ____	3 ____	4 ____	5 ____
13*	The thought of being deep in the woods, away from civilization, is frightening.	1 ____	2 ____	3 ____	4 ____	5 ____
14*	My feelings about nature do not affect how I live my life.	1 ____	2 ____	3 ____	4 ____	5 ____
15*	Animals, birds, and plants should have fewer rights than humans.	1 ____	2 ____	3 ____	4 ____	5 ____
16	Even in the middle of the city, I notice nature around me.	1 ____	2 ____	3 ____	4 ____	5 ____

17	My relationship to nature is an important part of who I am.	1 ____	2 ____	3 ____	4 ____	5 ____
18*	Wilderness conservation is unnecessary.	1 ____	2 ____	3 ____	4 ____	5 ____
19	The state of non-human species is an indicator of the future for humans.	1 ____	2 ____	3 ____	4 ____	5 ____
20	I think a lot about the suffering of animals.	1 ____	2 ____	3 ____	4 ____	5 ____
21	I feel very connected to all living things and the earth.	1 ____	2 ____	3 ____	4 ____	5 ____
22*	Nature is strong enough to recover from any human impact.	1 ____	2 ____	3 ____	4 ____	5 ____

Scoring Information

Reverse scored items*: 2, 3, 10, 11, 13, 14, 15, 18, 22; NR-self items: 5, 7, 8, 12, 14, 16, 17, 21; NR-perspective items: 2, 3, 11, 15, 18, 19, 20, 22; NR-experience items: 1, 4, 6, 9, 10, 13
Overall NR score is calculated by averaging all 22 items (after reverse scoring appropriate items). Scores on the 3 NR dimensions are also calculated by averaging appropriate items after reverse scoring.

Nisbet, E. K. L., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, *41*, 715-740.

Appendix C

Pre and Post Journal Prompt/Student Assignment

1. What does the word “nature” mean to you?

2. Describe your current connection to nature. In doing so, please address the following.

    How do you connect with nature using your body and senses, if at all?

    How do you feel about nature? How do you feel when you are in nature?

    What steps, if any, do you take to care for nature?

    Have you ever found life meaning through natural landscapes or natural events? If so, please share.

    Where do you see beauty in nature, if at all?

3. Overall, how connected do you feel to nature?